

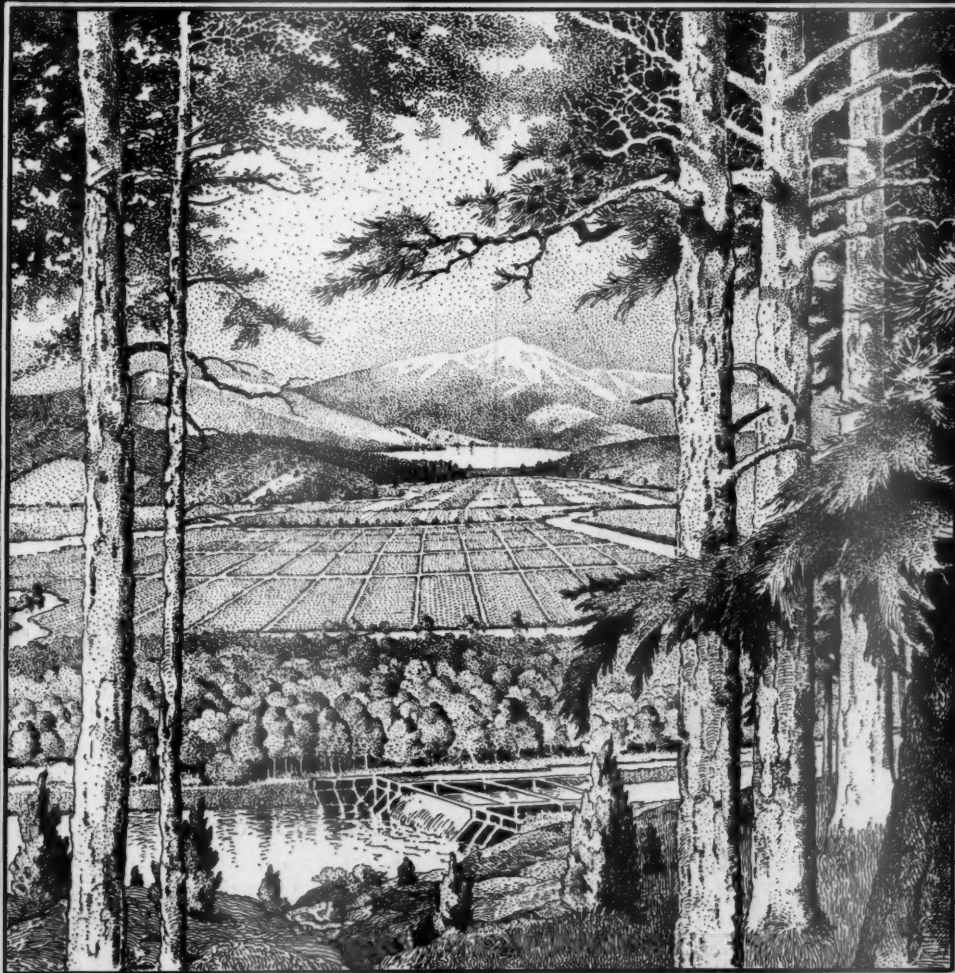
AMERICAN FOREST CONGRESS

Vol. XI—No. 1

JANUARY, 1905

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E. A. HITCHCOCK,
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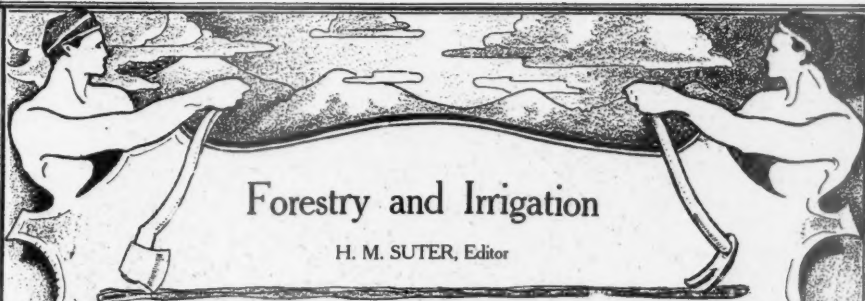
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Forestry and Irrigation

H. M. SUTER, Editor

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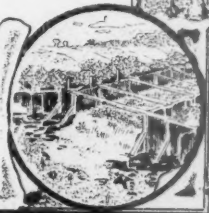
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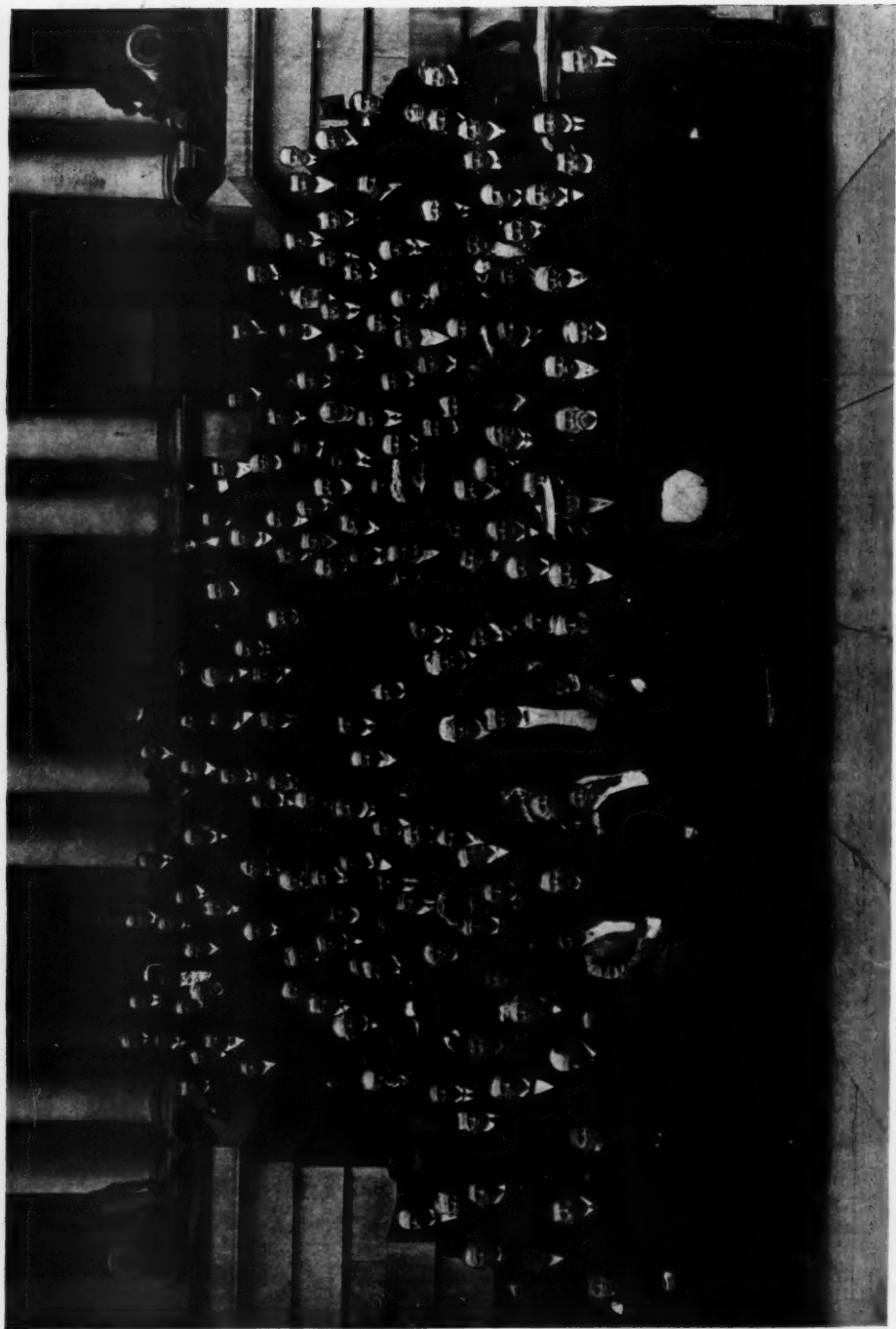


Photo by Prince, Washington, D. C.

A Group of Delegates to the American Forest Congress as they Appeared on the Steps of the Navy Department Just Before their Reception by the President at the White House. This Group Includes Only those Delegates who had Arrived by Noon on January Second.

Forestry and Irrigation.

VOL. XI.

JANUARY, 1905.

NO. 1.

AMERICAN FOREST CONGRESS

Held at Washington, D. C., January 2 to 6—A
Large Attendance of Delegates Representing Im-
portant Interests in Every Section of the Country

THE American Forest Congress, held at Washington, D. C., the first week in January, was not only by far the most successful meeting devoted to forestry that has been held in this country, but it will go down as one of the most striking gatherings that has been given up to any economic subject. Washington is a city that sees many important conventions every year, and the American Forest Congress in the opinion of men prominent in official life was among the most influential gatherings that have taken place at the nation's capital in a score of years.

The purpose of this Congress, as announced in the official call, was "to establish a broader understanding of the forest in its relation to the great industries depending upon it; to advance the conservative use of forest resources for both the present and the future needs of these industries, and to stimulate and unite all efforts to perpetuate the forest as a permanent resource of the nation."

That the time was ripe for such a gathering is amply testified to by the large and influential crowd of delegates who attended. The attendance, which far exceeded the expectations of the Committee on Arrangements, included practically all persons engaged directly in forest work, the leaders in state forest associations, and an unusually influential lot of representatives from the railroad, lumbering, mining, irrigation, and grazing interests of the country. A better idea of the attendance at, and interest in the Congress can be had when it is stated that at its eight separate sessions the average attendance was 1,000. The large hall was crowded at the opening

session, and the interest was so keen throughout the Congress that the attendance at the last session was even larger.

In addition to a special meeting at which a notable address by the President of the United States was the leading feature, the program included half-day sessions devoted particularly to irrigation, the lumbering industry, the grazing industry, railroads in their relation to the forest, importance of forests to mining, and one devoted to national and state forest policy. At each of these sessions a man prominent in the line of work under discussion acted as presiding officer, while the papers and addresses presented were by men of achievement in their particular lines of work.

To President Roosevelt, whose emphatic stand on forest questions has done so much for the movement, and whose address at this Congress is a further ringing "call to arms," such a gathering must have been very reassuring. Likewise to Secretary Wilson, who has for nearly eight years been such a stanch friend of the Government's forest work, and in addition, as President of the American Forestry Association, has given decided impetus to the general forest movement, the success of this Congress must be especially pleasing.

More than all, to Mr. Gifford Pinchot, Forester of the United States Department of Agriculture, who has worked with untiring energy to bring about a better understanding in regard to our forests, the meaning of such a gathering, and the many deserved tributes paid to his work during it, must come with special gratification and significance and give him immense

encouragement for the future of the great work in his charge. It is not too much to say that forestry takes on a new meaning to the American people from the date of this Congress.

As the daily proceedings of the Congress have appeared in the newspapers and the full text of its proceedings will be published in book form about March 1, this account is limited to a mere outline of what occurred at the various sessions. The resolutions adopted by the Congress and the list of delegates attending are given in full.

Beginning on Monday, January 2nd, the day set aside on the program for the registration of delegates and attendance at President Roosevelt's New Year's reception at the White House, the success of the Congress was assured. As early as eight o'clock in the morning, before the doors of the National Rifles' Armory were open many delegates were seeking admission in order to register and receive their delegates' cards. During the day about two hundred and fifty delegates, coming from every section of the United States, and some from Canada, had called upon Mr. William L. Hall, Secretary of the Congress, and presented their credentials.

At noon, according to program, the delegates began to assemble at the northeast entrance to the War, State, and Navy building, in order to attend President Roosevelt's reception in a body. It was here that the photograph was taken from which the frontispiece of this number of *FORESTRY AND IRRIGATION* was made. It shows only those delegates who had arrived up to noon on Monday, January 2. Promptly at 12:45 the delegation, headed by Mr. Gifford Pinchot, took up the position in line reserved for it.

Following the White House reception there were no further events scheduled for the delegates, the committee on arrangements having felt that the balance of Monday should be open in order that all could get settled in time for the regular sessions of the Congress beginning Tuesday morning.

THE OPENING SESSION.

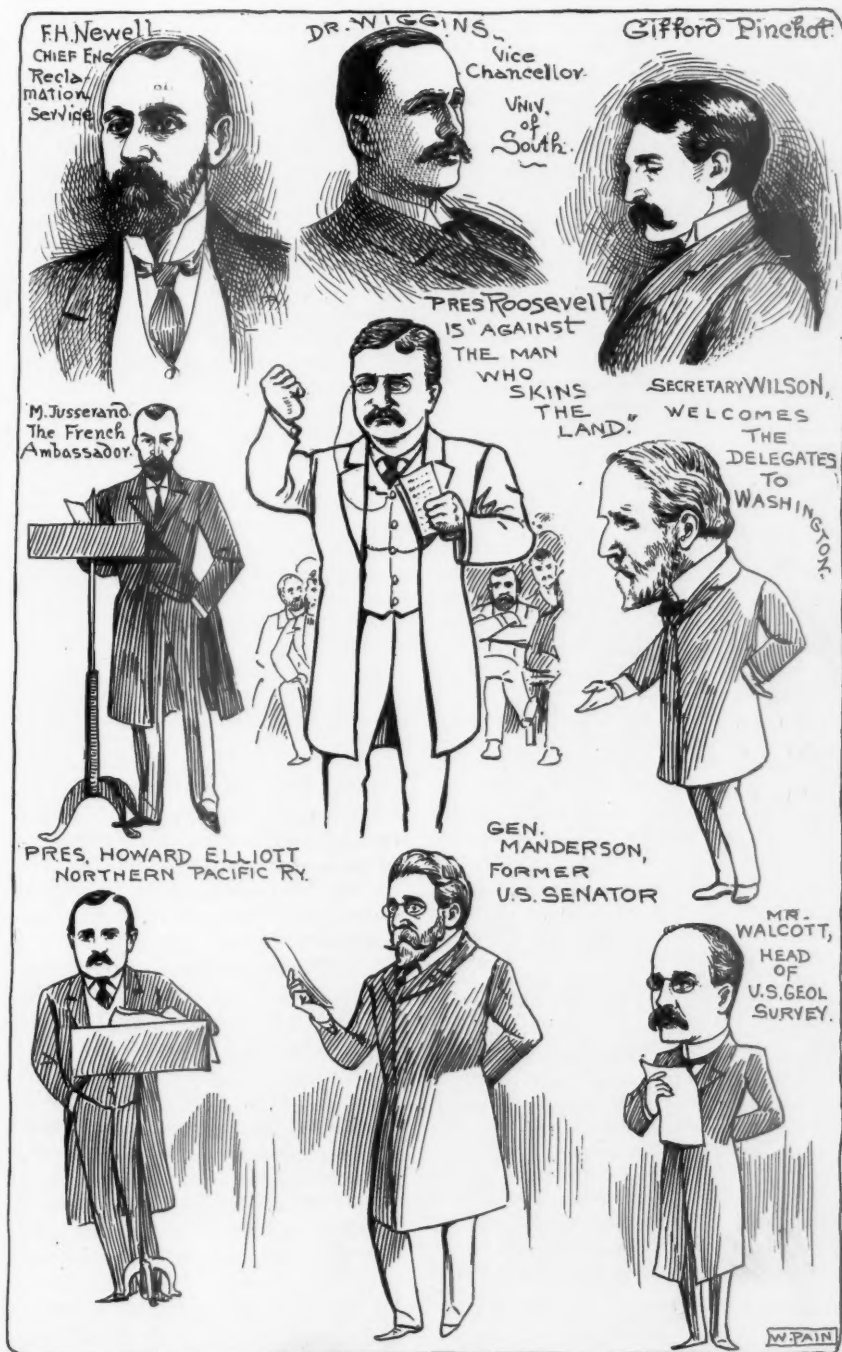
At 10 o'clock, Tuesday morning,

promptly on the hour, President Wilson called the Congress to order. In spite of unusually disagreeable weather, the large assembly hall was crowded to the doors, more than one thousand persons being present. As President of the Congress and of the American Forestry Association, under whose auspices it was being held, Hon. James Wilson delivered the address of welcome. President Wilson's address was followed by the reading of the report of the Directors of the American Forestry Association on the "Progress and Condition of Forestry in the United States." The report was presented by Mr. Edward A. Bowers.

Immediately following, the chair appointed a committee on resolutions, consisting of Mr. F. J. Hagenbarth, president of the National Live Stock Association; Mr. N. W. McLeod, president, National Lumber Manufacturers' Association; Mr. Gifford Pinchot, Forester, United States Department of Agriculture; Mr. T. J. Grier, superintendent, Homestake Mining Company, of South Dakota; Mr. Thomas Cooper, land commissioner, Northern Pacific Railway; Dr. J. T. Rothrock, of the Pennsylvania Reservation Commission, and Mr. F. H. Newell, chief engineer, United States Reclamation Service.

At this point, President Wilson called on Hon. John Lacey, Member of Congress from Iowa, and chairman of the House Committee on Public Lands, for a short address. Mr. Lacey responded in excellent spirit, stating his high appreciation of the needs of conservative forest management in the United States; and he paid a glowing tribute to the Secretary of Agriculture and to Mr. Pinchot for their excellent work in directing the Government forest service. He was followed by Mr. Aubrey White, commissioner of Crown lands of Canada, who described in an interesting manner the forest resources of Canada, and how his government is looking out for their preservation.

Following Mr. White, Mr. W. S. Harvey, president of the board of trustees of the Philadelphia Commercial Museum, and representative of the



Pennsylvania State Forestry Association, was called upon and made an interesting talk on the commercial value of forestry, and made numerous suggestions regarding general forest policy. General Charles F. Manderson, former United States Senator from Nebraska, and a representative of the Chicago, Burlington & Quincy Railroad, was the next speaker, and he made an eloquent appeal for the general preservation of the forests. Dr. J. T. Rothrock, ex-commissioner of forestry of Pennsylvania, and at present secretary of its forest reservation committee, was the next to be called upon. He asked that as a mark of respect to the various delegates who had come from every section of the country to attend the Congress, that those who were not members of the American Forestry Association be elected by the directors at the earliest possible hour, as a mark of appreciation—a suggestion which was acted upon favorably at a later session of the Congress.

Hon. W. A. Reeder, Member of Congress from Kansas, followed with a short address, and called special attention to the dependence of the irrigation interests on prosperous forests. He also alluded to the glaring land frauds in the West, and suggested that the American Forest Congress use its efforts to petition the Congress of the United States to repeal the present vicious laws. The Rev. Dr. Edward Everett Hale was then asked to speak, and responded in characteristic fashion, putting forth a special plea for the preservation of the White Mountain forests in New Hampshire. Professor Roth followed with an interesting talk on forest conditions in Michigan; he in turn was followed by Dr. C. A. Schenk, director of the Biltmore Forest School, who spoke interestingly of forest conditions in the Southern Appalachians. The morning session closed with a short address by Mr. E. S. Gosney, president of the Arizona Wool Growers' Association.

SESSION OF TUESDAY AFTERNOON, JANUARY 3.

This session was devoted particular-

ly to the importance of the public forest lands to irrigation. Mr. F. H. Newell, chief engineer of the United States Reclamation Service, was in the chair. The first paper of this session was on "The Close Relation Between Forestry and Irrigation," by Mr. Guy Elliot Mitchell, secretary of the National Irrigation Association, who described in a pointed way the close dependence of the success of irrigation on the forest. At this point Mr. Newell asked United States Senator Clark, of Wyoming, to take the chair. Mr. Newell then spoke on the subject of "Forests and Reservoirs," outlining in a succinct manner the immense part that is being played by the forests in the reclamation work of which he is the head.

Following Mr. Newell, Mr. J. B. Lippincott, supervising engineer of the Reclamation Service, delivered an exceedingly valuable address on "The Relation of Forests to Stream Flow." Mr. Lippincott was followed by Mr. Morris Bien, in charge of the legal work of the Reclamation Service, who took for his topic the pertinent subject, "Rights of Way in the Forest Reserves." "Irrigation Construction and Timber Supplies" was the subject offered by Mr. Arthur P. Davis, assistant chief engineer of the United States Reclamation Service. Two short impromptu addresses by Mr. H. M. Wilson, of the United States Geological Survey, and Professor Toumey, of the Yale Forest School, followed.

Mr. Hayes, president of the Appalachian Park Association, was then introduced and made an appeal for the establishment of a forest reserve in the mountains of the south. He was followed by Mrs. Lydia Phillips Williams, one of the delegates from Minnesota, and chairman of the forestry committee of the International Federation of Women's Clubs. She made an excellent address, showing what a potent force the women's organizations have been in the forest movement. Dr. B. E. Fernow was then called on and responded with a short and valuable address.



THE LUMBERING INDUSTRY AND THE FORESTS.

This session, which was called to order at 10 a. m. on Tuesday, January 4, was devoted entirely to the foregoing subject. Mr. N. W. McLeod, president of the National Lumber Manufacturers' Association, was in the chair. After an exceedingly interesting talk from Mr. McLeod, he introduced Mr. J. E. Defebaugh, Editor of the *American Lumberman*, who addressed the Congress on the subject of the "Changed Attitude of Lumbermen on Forestry."

He was followed by Mr. M. C. Moore, secretary of the National Slack Cooperage Manufacturers' Association, on "The Importance of Forestry to the Woodworking Industry." A paper was then presented by Mr. John L. Kaul, president of the Kaul Lumber Company of Alabama, on the question "Is Forestry Practicable on Long-leaf Pine Lands?" Colonel George P. Emerson, vice-president of the Northwestern Lumber Company of Washington, addressed the Congress on "Our Pacific Coast Forests, and Lumbering as Differing From Other Forests." Mr. George K. Smith, secretary of the National Lumbermen Manufacturers' Association, then spoke on "The Importance of Lumbering Statistics." "Opportunities for Lumbering in the Philippines" was the subject of a talk by Captain George P. Ahern, chief of the Philippine Forestry Bureau. Owing to illness, Dr. Albert Shaw, Editor of the *Review of Reviews*, was unable to be present to deliver his address on "The Relation of the Forests to the Publishing Business."

The next speaker was Mr. George W. Hotchkiss, secretary of the Illinois Lumber Dealers' Association, who spoke on "The Lumber Dealers' Interest in Forest Preservation." He was followed by Mr. John A. McCann, editor *National Coopers' Journal*, on "Cooperage and Its Relation to Forestry."

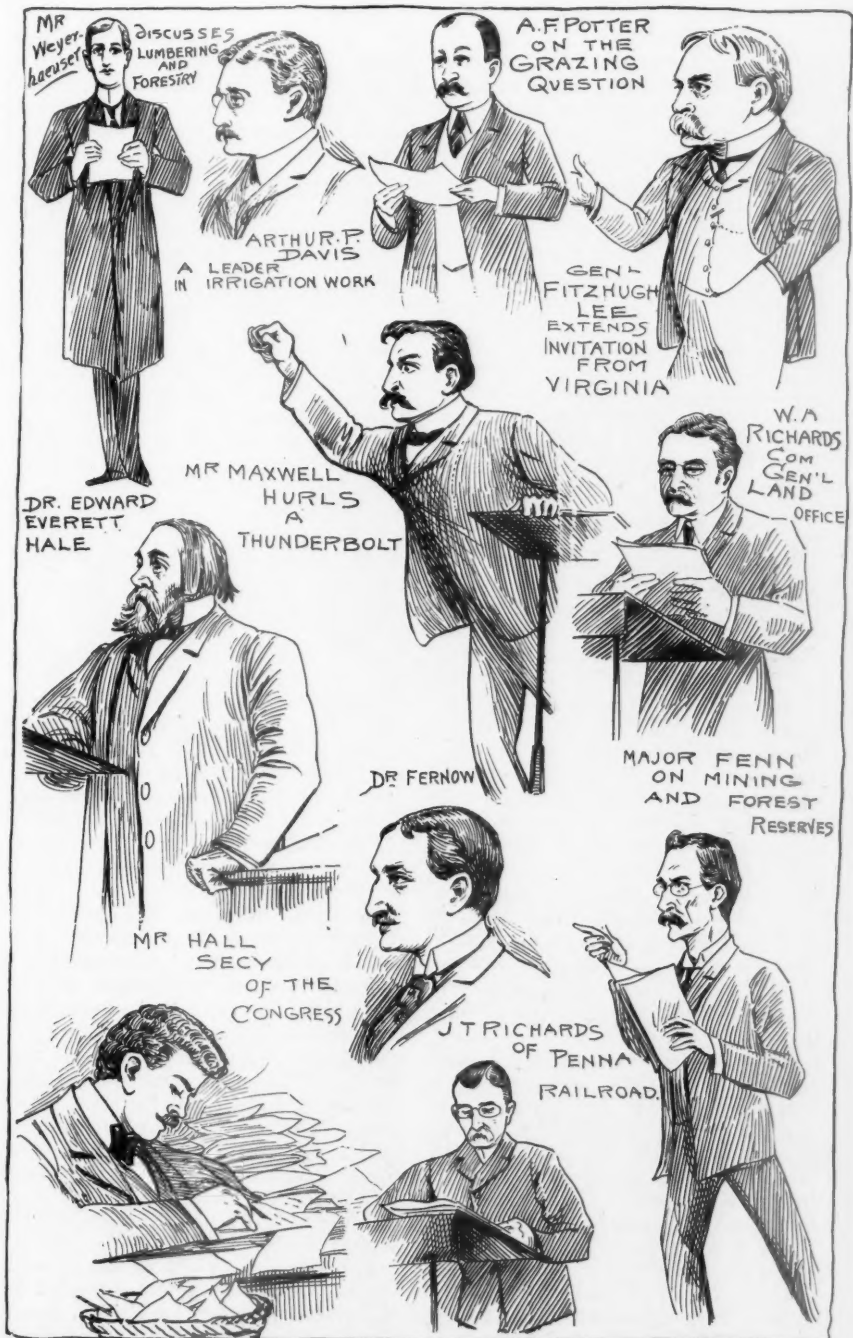
THE GRAZING SESSION.

Mr. F. J. Hagenbarth, president of the National Live Stock Association,

presided over the meeting on the afternoon of January 4, which was called to order at 2 p. m. The first speaker was Mr. W. B. Candland, of the Utah Wool Growers' Association. Mr. A. F. Potter, grazing expert, of the Bureau of Forestry, then delivered an address on the subject of "Practical Results of the Regulation of Grazing on the Forest Reserves," illustrated by examples, and with the subject clearly expounded. "The Protection of Home Builders in the Regulation of Grazing on the Forest Reserves" was the topic discussed by Mr. E. S. Gosney, president of the Arizona Wool Growers' Association. An interesting address was contributed on the subject of "Sheep Grazing in the Reserves, From a Layman's Standpoint," by Prof. L. H. Pammel, of the Iowa State College. General Fitzhugh Lee was introduced, and extended an invitation to the members of the Congress to visit the Jamsetown Exposition in 1907. The open discussion which followed was participated in by Mr. Jackson; Mr. Campbell, secretary of the Canadian Forestry Association; Mr. G. O. Shields, of New York, president of the League of American Sportsmen; Mr. Lynn, of Idaho, and Mr. Little, of Oklahoma.

RECEPTION BY MR. PINCHOT.

On Wednesday evening, January 4, the more serious part of the program was laid aside, and the delegates and their friends attended a delightful reception given in their honor by Mr. and Mrs. James W. Pinchot and their son, Mr. Gifford Pinchot, forester of the United States Department of Agriculture. Mrs. Pinchot, who welcomed the guests, was assisted in receiving by the Secretary of Agriculture and Mr. Gifford Pinchot. The other members of the receiving party were Mrs. Taft, wife of the Secretary of War; Mrs. Hitchcock, wife of the Secretary of the Interior; Mrs. Chaffee, wife of the Lieutenant-General of the United States Army; Mrs. Walcott, wife of the director of the United States Geological Survey; Mrs. Newell, wife of the chief engineer of the Reclamation Service; Mrs. Hobson, Mrs. J. B.



Henderson, Mrs. Archibald Hopkins, Mrs. Cowles, Mrs. W. P. Eno, Mrs. Spencer, Miss Bigelow, Miss Boardman, and Miss Morgan. The assemblage was a varied one, including prominent western mining men, leading stockmen, scientists, lumbermen, foresters, public men, diplomats, officers of the Army and Navy, and still others who were just plain citizens. In the decorations the green of the forest was prominent in the halls and spacious library, where refreshments were served; every decoration was in keeping, including candy in the shape of logs and log shavings; miniature trees with candy icicles, and many other pleasing and dainty reminders of the forest. It was a remarkable gathering of interesting people, even for Washington.

RAILROADS AND THE FORESTS.

With Mr. Howard Elliott, president of the Northern Pacific Railroad, in the chair, the session of Thursday morning was called to order at 10 o'clock for the discussion of the above topic. General Charles Manderson, general solicitor of the Chicago, Burlington & Quincy Railroad, was introduced as the first speaker by Mr. Elliott, his topic being "What Information is Most Urgently Needed by Railroads Regarding Timber Resources." In line with the Bureau of Forestry's widely exploited experiments in treating railroad ties, the next paper, on "The Work of the Pennsylvania Railroad in Planting Timber for Cross-ties," by Mr. J. T. Richards, chief engineer, maintenance of way, Pennsylvania Railroad system, was particularly timely. A number of interesting facts were brought out in President L. E. Johnson's address on the question "Is It Practicable for Railroads to Hold Forest Lands for Future Supplies of Timber?" Mr. Johnson is the president of the Norfolk & Western Railroad Company. Considerable interest was displayed in Mr. Hermann von Schrenk's paper on "The Results of the Preservative Treatment of Railroad Timbers to Prolong Durability," as he is in charge of the timber-testing plants of the Bureau of Forestry.

During this session Dr. Edward Everett Hale presented a resolution favoring the establishment of a national forest reserve in the White Mountains. Mr. Harvey made an announcement that all delegates not already members of the American Forestry Association had been elected at a special meeting of the board of directors, as suggested by Dr. J. T. Rothrock at the opening session on Tuesday.

SPECIAL SESSION, THURSDAY AFTERNOON, JANUARY 5.

The interest of the Congress was centered in this session, held at the National Theater, which attracted an audience of more than 2,000 persons, at which President Roosevelt delivered the principal address, on "The Forest in the Life of a Nation." The President's address made a deep impression and will be a tremendous influence in the forest movement, as it has been published throughout the country. Secretary Wilson was chairman of the meeting. "The Forest Policy of France" was discussed in an exceedingly interesting manner by Mr. J. J. Jusserand, Ambassador to the United States from France, and Mr. Howard Elliott, president of the Northern Pacific Railway, presented an able discussion of "The Dependence of the Business Interests Upon the Forests." He was followed by Mr. F. E. Weyerhaeuser, of the Weyerhaeuser Lumber Company.

Dr. B. L. Wiggins, vice-chancellor of the University of the South, read an able paper on the "Attitude of Educational Institutions Toward Forestry." In it he sketched the beginning of education in forestry in this country and the trend it is likely to take in the future. The closing address of the meeting was delivered by Hon. John Lamb, Member of Congress from Virginia, who spoke eloquently of the "Importance of Forests to Agriculture."

FORESTRY AND MINING.

Dr. David T. Day, of the United States Geological Survey, presided at the morning session on Friday, January 6, when discussions were confined



to the subject mentioned above. Mr. A. L. Fellows, consulting engineer, United States Reclamation Service, delivered the opening address, on the subject of "The Development of Water Power as Related to Forest Reserves." Dr. Day then made a short address. Captain Seth Bullock, supervisor of the Black Hills Forest Reserve, presented a valuable paper on the question "Will the Administration of the Forest Reserves on a Conservative Basis Retard the Development of Mining?" Mr. T. J. Grier, superintendent of the Homestake Mining Company of South Dakota, addressed the Congress on "How the Forest Reserves Help Mining." Following this, Maj. F. A. Fenn, supervisor forest reserves in Idaho and Montana, spoke on "Mining in the Forest Reserves." The closing address of this session was delivered by Mr. George H. Maxwell, executive chairman of the National Irrigation Association, on the "Value of Forestry to Commercial Interests." He aroused much enthusiasm and showed clearly how generally the business interests are dependent on the forests of the country.

FINAL SESSION, JANUARY 6.

Owing to the great amount of business to be accomplished by the Congress, the afternoon's regular program was shortened considerably, two ad-

resses being omitted, and the extra time given over to discussion of resolutions, adoption of same, and miscellaneous business. Mr. Gifford Pinchot presided at the meeting, and Secretary Wilson was present to make a farewell speech to the delegates. Mr. Charles D. Walcott, director of the United States Geological Survey, presented the "Work of the Geological Survey in Mapping the Reserves" in a graphic manner; and Mr. W. A. Richards, commissioner of the General Land Office, outlined the work of his department in the administration of the reserves. Mr. Overton W. Price, associate forester, Bureau of Forestry, was then called upon by Mr. Pinchot to describe the work and aims of the Bureau of Forestry, after which the entire time of the Congress was given over to the considerations of the report of the Committee on Resolutions, and the discussion of miscellaneous subjects of general interest.

In addition to the various events on the regular program, two informal "smokers" were held at the Shoreham Hotel, one on Tuesday evening, January 3, and the other on Thursday evening, January 5. They were attended mainly by men actively engaged in forest work and the discussions were of a technical character.

RESOLUTIONS

Following is the Text of the Resolutions Adopted by the Congress:

RESOLVED, That we urge upon Congress and upon all legislative bodies the necessity at all times of giving full protection to the forests of the country and of preserving them through wise and beneficent laws, so that they may contribute in the most complete manner to the continued prosperity of the country.

RESOLVED, That we earnestly commend to all state authorities the enactment and enforcement of laws for the protection of the forests from

fire, and for reducing the burden of taxation on lands held for forest reproduction in order that persons and corporations may be induced to put in practice the principles of forest conservation.

RESOLVED, That we are in entire accord with the efforts to repeal the Timber and Stone Act, and we favor the passage of an act as a substitute therefor which shall confer authority upon the proper officer of the United States to sell timber growing on the

public lands when such sale shall be for the public welfare.

RESOLVED, That we favor the passage by Congress of an amendment to the law regarding exchange of lands included within a forest reserve so that such exchanges or lieu selections shall be confined to lands of equivalent value or similar condition as regards forest growth.

RESOLVED, That the law which prohibits the export of forest reserve timber from the state in which it is grown should be repealed as to the states in which the export of such timber is in the public interest, and in no others.

RESOLVED, That we favor the passage of a law which will authorize the sale of all the non-mineral products of the forest reserves, the proceeds of such sales to be applied to their management and protection, and the construction of roads and trails within the forest reserves.

RESOLVED, That we heartily approve the movement for the unification of all the forest work of the Government, including the administration of the National Forest Reserves, in the Department of Agriculture, and urge upon Congress the necessity for immediate action to that end.

RESOLVED, That Congress declare forfeited all right of way permits not exercised promptly upon issuance, and secure to all industries engaged in lawful business, and which will exercise promptly their permits, the possession of necessary rights of way, in the same manner that railroads and irrigating companies are secured in their rights of way, and that the various right-of-way acts on forest reserves and other public lands be so amended as to provide for reasonable payment for the use of these valuable rights.

RESOLVED, That this Congress urges upon all schools, and especially the rural schools, the necessity for a study of forests and tree-planting in their effect upon the general well-being of the nation, and in particular upon the wealth and happiness of communities through the modification of local climate; and that we urge all

state legislatures to provide laws and financial aid to consolidate the rural schools in units sufficiently large that forestry, agriculture, and home economics may be successfully taught by precept, example, and practical work.

RESOLVED, That this Congress recommends the increase of opportunities for general forest education in schools and colleges, and for professional training in post-graduate schools; and approves the movement to extend and systematize industrial education in the interest of a more general distribution of the population on the land.

RESOLVED, That the Congress of the United States be asked to appropriate adequate sums for the promotion of forest education and forest experiment work in the agricultural colleges and experiment stations of the United States; Provided, however, such appropriations be made directly to state forestry departments, bureaus, or commissions, where existing, to be used in their respective states as may seem best for forestry educational purposes.

RESOLVED, That this Congress approves and reaffirms the resolutions of various scientific and commercial bodies during the past few years in favor of the establishment of national forest reserves in the Southern Appalachian Mountains and in the White Mountains of New Hampshire, and that we earnestly urge the immediate passage of bills for these purposes which are now pending in both houses of Congress.

RESOLVED, That we protest against the attempt to reduce the area of the Minnesota National Forest Reserve and against any step which would enhance the difficulty of the perpetuation of the forests upon it.

RESOLVED, That we heartily endorse the movement for the purchase of the Calaveras Grove of Big Trees by the National Government and earnestly recommend the prompt enactment of legislation to that end; and, further, we recommend the reconveying by the State of California to the National Government of the Yosemite

Park in order that this may be adequately protected and placed upon the same basis as other national parks.

RESOLVED, That this Congress urges tree-planting and the preservation of shade trees along public highways throughout America.

RESOLVED, That we approve the suggestion that a tree be planted at Mount Vernon to commemorate the American Forest Congress, and that funds for this purpose be collected through *Forestry and Irrigation*.

RESOLVED, That as Oklahoma would immeasurably profit by increased land valuation resulting from greater crop capacity as the outgrowth of wind reduction; therefore, the territory should be empowered to offer

school land occupants a reasonable realty tax reduction during a stipulated growing period of tree wind-breaks; Provided, that the department of government under which the nation's forestry interests are managed shall outline, control, and perfect, in all particulars, determining how and to which lands the provisions shall apply, except that purchasers at the time of sale have option as to acceptance of these terms.

RESOLVED, That it is the sense of this Congress that the National Homestead Law should be amended so as to require the planting of at least 5 per cent of the area of a homestead before final title be acquired, and that the tree planting be under the supervision of the Bureau of Forestry.

LIST OF DELEGATES

Following is a complete list of Delegates to the American Forest Congress who registered at the Secretary's office:

- Adams, J. B., Washington, D. C.; representing Bureau of Forestry.
 Adams, Miss B. E., Washington, D. C.; Gen. Land Office.
 Agar, John G., New York city; Society for Protection of the Adirondacks.
 Agnew, Mrs. Kate L., Valparaiso, Ind.; State of Indiana.
 Ahern, Capt. Geo. P., Manila; Forestry Bureau of Philippines.
 Aitken, Geo., Woodstock, Vt.; Vermont Forestry Association.
 Akerman, A. K., State Forester, Boston, Mass.; Massachusetts Forestry Association.
 Allen, E. T., Forest Inspector, Bureau of Forestry, Washington, D. C.
 Allen, E. W., Office of Ex. Stations, Dept. of Agric., Washington, D. C.
 Anderson, A. A., New York city; Forest Reserve Service and New York Chamber of Commerce.
 Anderson, J. W., Gen. Land Office, Washington, D. C.
 Andrews, Byron, Washington, D. C.; American Forestry Association from South Dakota.
 Atkinson, A. L. C., Honolulu, Hawaii.
 Ayres, Philip W., Forester, Society for Protection of New Hampshire Forests, Concord, N. H.
 Baily, Joshua L., Philadelphia, Pa.; American Forestry Association from Pennsylvania.
 Baird, Dan. W., Nashville, Tenn.; Editor *Southern Lumberman*.
 Baker, J. F., Bureau of Forestry, Washington, D. C.; Salim Valley Telephone Co.
 Ball, C. R., Washington, D. C.; Iowa Park and Forestry Association.
 Barber, J. T., Eau Claire, Wis.; Miss. Val. Lumberman's Assn. and Northwestern Hemlock Mfrs. Assn.
 Barnard, E. C., U. S. Geological Survey, Washington, D. C.
 Barns, W. E., St. Louis, Mo.; Editor *St. Louis Lumberman*.
 Bartlett, J. H., Middleboro, Ky.; State of Kentucky.
 Becker, G. F., U. S. Geological Survey, Washington, D. C.
 Beecher, F. R., Retail Lumber Dealers' Assn., Canadaigua, N. Y.
 Bell, Dr. Robt., Agricultural Department, Ottawa, Ontario, Canada; Canadian Forestry Association.

B

- Bentz, Hon. P. J., Woonsocket, S. D.; State of South Dakota.
- Berg, Walter G., Philadelphia, Pa.; Lehigh Valley R. R. system.
- Berthrong, I. P., Washington, D. C.; General Land Office.
- Bidwell, Geo. F., Chicago, Ill.; Chicago & Northwestern Ry. Co.
- Bien, Morris, U. S. Geological Survey, Washington, D. C.
- Binford, L. M., Saco, Maine; National Assn. of Box and Box Shook Mfrs. of United States.
- Bitler, F. L., Philadelphia, Pa.; Pennsylvania Forestry Association.
- Blades, J. B., Elizabeth City, N. C.; National Wholesale Lumber Dealers' Association and North Carolina Forestry Association.
- Blanchard, C. J., U. S. Geological Survey, Washington, D. C.
- Bliss, Geo. H., Spokane, Wash.; Reclamation Service.
- Blodgett, James H., Washington, D. C.; American Forestry Association.
- Bogue, Prof. E. E., Michigan Agricultural College, Agricultural College P. O., Michigan.
- Bond, Frank, General Land Office, Washington, D. C.
- Borst, Theo. F., Clinton, Mass; American Forestry Association from Massachusetts.
- Brooks, Hon. F. E., Colorado Springs, Colo.; State of Colorado.
- Bowers, Edward A., New Haven, Conn.; Connecticut Forestry Association and American Forestry Assn.
- Brooks, A. H., U. S. Geological Survey, Washington, D. C.
- Bruce, E. S., Bureau of Forestry, Washington, D. C.
- Bruce, Grant, Bureau of Forestry, Washington, D. C.; American Forestry Association.
- Bullock, Capt. Seth, Deadwood, S. D.; South Dakota Forest Reserve Service.
- Bunker, Wm. M., Washington, D. C.; Chamber of Commerce of San Francisco.
- Burkholder, S., Crawfordsville, Ind.; National Wholesale Lumber Dealers' Association.
- Burton, P. G., Chesapeake & Potomac Telephone Co., Washington, D. C.

C

- Campbell, R. H., Secretary Canadian Forestry Association, Ottawa, Ontario, Canada.
- Candland, W. D., Mt. Pleasant, Utah; Utah Wool Growers' Association.
- Cary, Austin, Brunswick, Me.; American Forestry Assn. from Maine.
- Chapman, C. S., Bureau of Forestry, Washington, D. C.
- Chapman, Herman H., Bureau of Forestry, Washington, D. C.; American Forestry Association.
- Charlton, R. H., Denver, Colo.; Forest Reserve Service.
- Chittenden, A. K., Bureau of Forestry, Washington, D. C.
- Chown, C. Y., Queen's University, Kingston, Ontario, Canada.
- Churchill, C. S., Roanoke, Va.; Norfolk & Western Railway.
- Clark, C. C., Washington, D. C.; Department of Agriculture.
- Clark, Hon. Clarence D., U. S. Senate, Washington, D. C.; State of Wyoming.
- Clark, Dr. J. F., Department of the Interior, Ontario, Canada; Ontario Bureau of Forestry.
- Clark, Dr. Wm. B., State Geologist, Baltimore, Md.; State Geological and Economic Society.
- Clarke, S. A., Gen. Land Office, Washington, D. C.; State of Oregon.
- Clement, G. E., Bureau of Forestry, Washington, D. C.; American Forestry Association.
- Cleveland, J. F., Chicago, Ill.; Chicago & Northwestern Railway.
- Clothier, Geo. L., Bureau of Forestry, Washington, D. C.
- Cochran, Geo. G., New York city; Erie Railroad Co.
- Cone, Albert B., Chicago, Ill.; *American Lumberman*.
- Conklin, Robt. S., Harrisburg, Pa.; Pennsylvania Forestry Association and Forestry Commission.
- Cooke, Chas. B., Richmond, Va.; State of Virginia.
- Cooper, Thos., St. Paul, Minn.; Northern Pacific Railway Co.
- Cosgriffe, T. A., Cheyenne, Wyo.; Northern Pacific Railroad.
- Coville, F. V., Washington, D. C.; American Forestry Association.

C

Cox, Wm. T., St. Anthony Park, Minn.; Minnesota State Forestry Association.

Craft, Q. R., Washington, D. C.; American Forestry Association from Kansas.

Craig, A. R., Mesa, Cal.; Forest Reserve Service.

Crawford, C. G., Washington, D. C.; American Forestry Association.

Crenshaw, R. C., Frankfort, Ky.; State of Kentucky.

Curtin, Gen. G. W., Sutton, W. Va.; State of West Virginia.

Craig, D. A., Washington, D. C.; Washington *Evening Star*.

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Croft, A. J., Enosburg, Vt.; Vermont Maple Sugar Makers' Association.

Cutler, J. H., Raleigh, N. C.; State of North Carolina.

D

Davant, T. S., Roanoke, Va.; Norfolk & Western Railway Co.

Davis, L. G., Saratoga, Wyo.; Wyoming Forest Reserve Service.

Daw, N. L., Roanoke, Va.; Norfolk & Western Railway Co.

Daish, John B., Washington, D. C.; National Hay Association.

Davis, A. P., U. S. Geological Survey, Washington, D. C.

Deal, J. T., Chairman, North Carolina Pine Association, Norfolk, Va.

Deering, Hon. Frank C., Bedford, Me.; State of Maine.

Defebaugh, J. E., Chicago, Ill.; Editor *American Lumberman*.

Dezendorf, Mr., General Land Office, Washington, D. C.

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Dill, Lewis, Baltimore, Md.; National Wholesale Lumber Dealers' Assn.

Dixon, Hon. J. M., Washington, D. C.; Montana Stock Growers' Assn.

Dock, Miss Mira L., State Forestry Commission, Harrisburg, Pa.

Donnelly, J. W., General Land Office, Washington, D. C.

DuBois, C. L., General Land Office, Washington, D. C.

Durgin, Jno. C., Sandy Hill, N. Y.; Forest, Water Storage and Manufacturing Association.

Drummond, A. T., Toronto, Canada; American Forestry Association.

E

Eaton, Hon. Geo. H., Calais, Me.; State of Maine.

Eberlein, Chas. W., Southern Pacific Railway.

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Edmands, J. Rayner, Boston, Mass.; Massachusetts Forestry Association.

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Elliott, S. B., State Forestry Commission, Harrisburg, Pa.

Emerson, Col. Geo. H., Hoquiam, Wash.; Pacific Coast Lumbermen.

England, Charles, Washington, D. C.; National Hay Association.

F

Faull, J. H., University of Toronto, Canada.

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Fenn, Maj. F. A., Kalispell, Mont.; Montana Forest Reserve Service.

Fernow, Dr. Bernhard E., Ithaca, N. Y.; American Forestry Association from New York and Society for Protection of the Adirondacks.

Fimple, J. H., General Land Office, Washington, D. C.

Fischer, Fred C., Tryon, N. C.; National Lumber Manufacturers' Assn.

Fisher, Prof. Richard T., Harvard University, Cambridge, Mass.

Fisher, Wm. H., Cincinnati, Ohio; State of Ohio.

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Fletcher, Dr. Jas., Ottawa, Ontario, Canada; Canadian Forestry Assn.

Foley, John, Bureau of Forestry, Washington, D. C.

Foster, H. D., Washington, D. C.; American Forestry Association.

Foster, N. C., Wisconsin Hardwood Lumbermen's Assn., Fairchild, Wis.

Fowler, Hon. B. A., Phoenix, Ariz.; Territory of Arizona.

Fox, Col. Wm. F., Superintendent of State Forests, Albany, N. Y.; Association for Protection of Adirondacks.

- Franklin, Blake, General Land Office, Washington, D. C.
- Freeman, Miss Harriet E., Boston, Mass., American Forestry Association from Massachusetts and Massachusetts Forestry Association.
- Freeman, Hon. Wm. F., State Forester, Indianapolis, Ind.; Indiana State Board of Forestry.
- Fulton, John, State Forestry Commission, Harrisburg, Pa.
- Gannett, Dr. Henry, U. S. Geological Survey, Washington, D. C.; Sierra Club.
- Gannett, Miss Mary C., Bureau of Forestry, Washington, D. C.; American Forestry Association.
- Gardner, W. A., Chicago, Ill.; Chicago & Northwestern Railway.
- Gardner, Wesley J., Bureau of Forestry, Washington, D. C.
- Garrett, Robert, Baltimore, Md.; delegate-at-large from Maryland.
- Garver, L. J., General Land Office, Washington, D. C.
- Gaskill, Alfred, Bureau of Forestry, Washington, D. C.
- Gennett, Andrew, South Carolina; State of South Carolina.
- Gibson, Edgar, Clyde Park, Mont.; State of Montana.
- Gilbert, Dr. G. K., Sierra Club, San Francisco, Cal.
- Gilfry, H. H., Washington, D. C.; State of Oregon.
- Gillenwaters, E. P., Glasgow, Ky.; State of Kentucky.
- Girtanner, Jules, Linden, N. J.; American Forestry Association.
- Goddard, Hon. Albert J., Tacoma, Wash.; Tacoma Chamber of Commerce.
- Gosney, E. S., President Arizona Wool Growers' Assn., Flagstaff, Ariz.
- Green, Dr. Samuel B., St. Anthony Park, Minn.; State of Minnesota and Minnesota State Forestry Assn.
- Green, Prof. W. J., Agricultural Experiment Station, Wooster, Ohio; State of Ohio.
- Grier, T. J., Superintendent Homestake Mining Co., Lead, S. D.
- Griffith, E. M., Madison, Wis.; State Forest Service.
- Grimes, E. P., Maine; State of Maine.
- Grinnell, Henry, Bureau of Forestry, Washington, D. C.
- Griswold, W. T., U. S. Geological Survey, Washington, D. C.
- Grosvenor, Gilbert H., Washington, D. C.; American Forestry Assn.
- Grunsky, C. E., Washington, D. C.; State of California.
- Gwinn, J. H., Pendleton, Ore.; Oregon Wool Growers' Association.
- Haas, L. G., Baltimore, Md.; Baltimore & Ohio Railroad.
- Hagenbarth, F. J., National Live Stock Association, Denver, Colo.
- Haines, A. S., Westtown, Pa.; Pennsylvania Forestry Association.
- Hale, Dr. Edward Everett, Washington, D. C.; State of Massachusetts, Massachusetts Forestry Association, Appalachian Mountain Club.
- Hall, Edward Hagaman, New York city; Association for Protection of the Adirondacks.
- Hall, Geo. F., Chicago, Ill.; Chicago-Texas L. & L. Co.
- Hall, James B., Clay City, Ky.; Beer Stock Manufacturers' Association.
- Hall, Wm. L., Bureau of Forestry, Washington, D. C.; Hawaii Forestry Service.
- Hansen, Prof. N. E., Agricultural College, Brookings, S. D.; State of South Dakota.
- Happy, H. W., General Land Office, Washington, D. C.
- Harrison, W. F., Norfolk, Va.; North Carolina Pine Association.
- Harvey, Wm. S., Philadelphia, Pa.; Pennsylvania Forestry Association.
- Hawes, Austin F., State Forester, New Haven, Conn.
- Hawley, R. C., Amherst, Mass.; American Forestry Association from Massachusetts.
- Hayes, C. W., U. S. Geological Survey, Washington, D. C.
- Hayes, R. P., Asheville, N. C.; State of North Carolina.
- Henry, Alfred J., Washington, D. C.; American Forestry Association.
- Henry, H. D., Athens, Ohio; Union Association of Lumber Dealers.
- Herndon, T. H., General Land Office, Washington, D. C.
- Hightower, Clement, Capitan, N. M.; Territory of New Mexico.

- Higgins, S. M., Forester, Cleveland Cliffs Iron Co., Negaunee, Mich.
- Hinshaw, G. W., President Stone Mountain Ry. Co., Winston, N. C.
- Hobbs, Jno. E., North Brunswick, Me.; American Forestry Assn.
- Hodge, Wm. C., Jr., Bureau of Forestry, Washington, D. C.
- Hodson, E. R., Washington, D. C.; Iowa Park and Forestry Assn.
- Holcombe, E. P., General Land Office, Washington, D. C.
- Holdredge, G. W., Chicago, Ill.; Chicago, Burlington & Quincy Ry. Co.
- Holmes, J.; State of Connecticut.
- Holt, W. A., Oconto, Wis.; Northwestern Hemlock Mfrs. Assn.
- Holter, Norman, Helena, Mont.; State of Montana.
- Hoover, T. L., Carlisle, Pa.; Pennsylvania Forestry Association.
- Hopkins, Dr. A. D., Washington, D. C.; American Forestry Association.
- Hotchkiss, Geo. W., Chicago, Ill.; Lumber Secretaries' Bureau of Information.
- Hoyt, Colgate, New York city; Missouri, Kansas & Texas Ry. system.
- Hutcheson, David, Congressional Library, Washington, D. C.
- Hutchinson, James, Randolph, Vt.; Delegate-at-large.
- Imes, R. P., Washington, D. C., American Forestry Association.
- Irvin, Hon. Edw. A., Curwensville, Pa.; State of Pennsylvania.
- Irvine, Wm., Chippewa Falls, Wis.; Missi. Valley Lum. Assn.
- Ivy, Thos. P., Conway, N. H.; State of New Hampshire.
- Jackson, Luis, New York city; Erie Railroad Co.
- Jastro, H. A., Bakersfield, Cal.; Kern County Cattle Growers' Association.
- Jenks, Robt., Cleveland, Ohio; Lumbering.
- Jensen, A. W., Ephraim, Utah; Forest Reserve Service.
- Johnson, L. E., Roanoke, Va., President Norfolk & Western Ry. Co.
- Jones, Hunt, Louisville, Ky.; State of Kentucky.
- Jones, H. H., Washington, D. C.; General Land Office.
- Jones, William, Tacoma, Wash.; Chamber of Commerce.
- Justus, T. W., Baltimore, Md.; Baltimore & Ohio Railroad.
- Kalaniana'ole, Hon. Jonah K., Honolulu, Hawaii; Territory of Hawaii.
- Kaul, Jno. L., Birmingham, Ala.; Southern Lumber Mfg. Assn.
- Keen, Miss Florence, Philadelphia, Pa.; American Forestry Association.
- Keller, O. B., New York city; American Forestry Association from New York.
- Kellogg, J. C., Louisiana; State of Louisiana.
- Kellogg, R. S., Fay, Kan.; State of Kansas.
- Kelsey, Frederick W., Orange, N. J.; American Forestry Association.
- Killen, Wm. H., Milwaukee, Wis.; Wisconsin Central Ry. Co.
- Kinney, David G., Washington, D. C.; Bureau of Forestry.
- Kittredge, G. W., Cincinnati, Ohio; Cleveland, Cincinnati, Chicago & St. Louis Ry. Co.
- Knepper, David, Harrisburg, Pa.; Pennsylvania State Forestry Service.
- Koch, Elers, Washington, D. C.; American Forestry Association.
- Lamb, Hon. John, Richmond, Va.; State of Virginia.
- Langille, H. D., Santa Barbara, Cal.; Forest Reserve Service.
- Langworthy, C. F., Washington, D. C.; American Forestry Association.
- Lazenby, Wm. R., Columbus, Ohio; Ohio State Forestry Society.
- Leland, J. D., Washington, D. C.; General Land Office.
- Lewis, W. H., Washington, D. C.; General Land Office.
- Lippincott, J. B., Washington, D. C.; U. S. Geological Survey.
- Little, Wm. T., Perry, Okla.; American Forestry Assn. from Oklahoma.
- Loring, Hon. C. M., Minneapolis, Minn.; Minnesota Forestry Assn.
- Luebker, Otto, Washington, D. C.; American Forestry Association.
- McAllaster, Birdsall, Omaha, Neb.; Union Pacific Ry. Co.

- MacNaughton, James, New York city; American Society of Civic Engineers, New York Board of Trade and Transportation, and Association for Protection of the Adirondacks.
- McBee, Silas, New York city; Delegate-at-large.
- McCann, John A., Philadelphia, Pa.; Editor *National Coopers' Journal*.
- McClure, R. C., Silver City, N. M.; Forest Reserve Service.
- McCoy, Wilbur, New York city; Atlantic Coast Line Railroad Co.
- McKeithan, D. T., South Carolina; State of South Carolina.
- McKinney, J. M., Washington, D. C.; General Land Office.
- McLeod, N. W., St. Louis, Mo.; Southern Lumber Mfgs. Assn.
- Macbride, Thos. H., Iowa City, Iowa; State of Iowa.
- McNeeley, E. J., Tacoma, Wash.; State of Washington.
- McPhaul, John, Washington, D. C.; General Land Office.
- McVean, M. J., Washington, D. C.; General Land Office.
- Macey, J. T., Washington, D. C.; General Land Office.
- Maffet, Miss Martha A., Wilkesbarre, Pa.; American Forestry Association.
- Maher, N. D., Roanoke, Va.; Norfolk & Western Railway.
- Manderson, Gen. Chas. F., Chicago, Ill.; Chicago, Burlington & Quincy Ry. Co.
- Macoun, Prof. J. M., Canadian Geological Survey, Ottawa, Ontario, Canada.
- Manning, W. H., Boston, Mass.; American Forestry Association.
- Marr, S. S., General Land Office, Washington, D. C.
- Marston, Roy L., Yale Forest School, New Haven, Conn.
- Mason, S. C., Berea, Ky.; State of Kentucky.
- Mast, Wm. H., Halsey, Neb.; State of Nebraska.
- Mather, William G., Cleveland, Ohio; Cleveland Chamber of Commerce.
- Mathewson, Dr. Arthur, Woodstock, Conn.; Connecticut Forestry Assn.
- Mattoon, W. R., Washington, D. C.; American Forestry Association.
- Maxwell, Geo. H., Chicago, Ill.; National Irrigation Association and State of California.
- Mead, Elwood, Washington, D. C.; Department of Agriculture.
- Meekham, H. S., Washington, D. C.; American Forestry Association.
- Merriam, Dr. C. Hart, Geological Survey, Washington, D. C.; Sierra Club and American Forestry Association.
- Merrill, H. G.; American Forestry Association.
- Merry, Capt. J. F., Dubuque, Iowa; Illinois Central Railroad Co.
- Methudy, L., St. Louis, Mo.; National Lumber Exporters' Association.
- Miller, Prof. Frank G., Lincoln, Neb.; University of Nebraska.
- Miller, L. C., Washington, D. C.; Bureau of Forestry.
- Miller, W. H., Madison, Ind.; Retail Lumber Dealers' Association.
- Mitchell, Guy E., Washington, D. C.; American Forestry Association.
- Moore, M. C., Milwaukee, Wis.; Editor *Packages*.
- Mosle, M. A.; Delegate-at-large.
- Mulford, Walter, New Haven, Conn.; State of Connecticut.
- Murphy, J. T., Washington, D. C.; General Land Office.
- N**
- Nelson, John M., Jr., Rider, Md.; State of Maryland.
- Newhall, D. S., Philadelphia, Pa., Pennsylvania Ry. Co.
- Newell, F. H., U. S. Geological Survey, Washington, D. C.
- Norris, Jos. L., Leesburg, Va.; State of Virginia.
- O**
- Oak, Hon. Chas. E., Bangor, Me.; State of Maine.
- Olmsted, F. E., Washington, D. C.; Bureau of Forestry.
- P**
- Pack, Charles L., Lakewood, N. J.; Cleveland Chamber of Commerce.
- Palmer, T. S., Washington, D. C.; American Forestry Association.
- Pammel, Prof. L. H., Secretary Iowa Park and Forestry Association, Ames, Iowa.
- Parsons, Mrs. Henry, New York city; American Forestry Association.
- Peavy, Geo. W., Washington, D. C.; American Forestry Association.

- P**
- Penrose, Dr. Chas. B., Philadelphia, Pa.; State of Pennsylvania.
- Perry, E. F., New York city; National Wholesale Lumber Dealers' Assn.
- Peters, J. Girvin, Washington, D. C.; American Forestry Association.
- Peyton, Miss J. S., General Land Office, Washington, D. C.
- Pinchot, Gifford, Bureau of Forestry, Washington, D. C.; Bureau of Forestry, American Forestry Association, Sierra Club, South American Foresters, Society American Civil Engineers.
- Pinchot, James W., New York city; New York Chamber of Commerce.
- Pollock, G. F., General Land Office, Washington, D. C.
- Pope, J. W., Atlanta, Ga.; State of Georgia.
- Potter, A. F., Bureau of Forestry, Washington, D. C.
- Potter, H. G., General Land Office, Washington, D. C.
- Price, Overton W., Bureau of Forestry, Washington, D. C.
- Purington, Pres. D. B., State University, Morgantown, W. Va.; State of West Virginia.
- Putnam, H. C., Eau Claire, Wis.; Lumbering.
- R**
- Rane, Prof. F. Wm., Durham, N. H.; New Hampshire College, Boston and Maine Railroad, State of New Hampshire.
- Reed, Franklin W., Washington, D. C.; Society American Foresters.
- Richards, J. T., Philadelphia, Pa.; Pennsylvania Railway Co.
- Rinewalt, John M., Mt. Carroll, Ill.; Delegate-at-large from Illinois.
- Ring, Hon. Edgar E., Forest Commissioner, Augusta, Me.
- Ross, D. M., Boise, Idaho; U. S. Geological Survey.
- Ross, Norman M., Ottawa, Canada; Dominion Forest Service.
- Roth, Prof. Filibert, Ann Arbor, Mich.; State of Michigan, University of Michigan.
- Rothrock, J. T., Secretary State Forestry Reservation Commission, Harrisburg, Pa.
- Russell, I. C., Washington, D. C.; National Geographic Society.
- Russell, Jas. S., Boston, Mass.; Massachusetts Forestry Association.
- Russell, F. B., Beer Stock Mfrs. Association, Louisville, Ky.
- S**
- Satterlee, J. B., General Land Office, Washington, D. C.
- Savage, H. N., U. S. Geological Survey, Washington, D. C.
- Scaife, Marvin F., Pittsburg, Pa.; Pennsylvania State Forestry Assn.
- Schaperkotter, Jas. F., Philadelphia, Pa.; Lehigh Valley Railroad system.
- Schenck, Dr. C. A., Biltmore, N. C.; Biltmore Forestry School.
- Schwarz, G. Fred, New York city; American Forestry Association from New York city.
- Scott, Chas. A., Halsey, Neb.; State of Nebraska.
- Sebastian, Jon., Chicago, Ill.; Rock Island Railway system.
- See, Mrs. Horace, New York city; American Forestry Association.
- Seeley, J. B., Virginia City, Mont.; Forest Reserve Service.
- Shaw, A. C., General Land Office, Washington, D. C.
- Shaw, Eugene, Wisconsin Hardwood Lumbermen's Assn., Eau Claire, Wis.; Miss. Valley Lum. Assn.
- Sheller, D. B., Tacoma, Wash.; Washington Forest Reserve Service.
- Sherfesse, W. F., Charleston, S. C.; State of South Carolina.
- Shepardson, H. L., Baldwinville, Mass.; National Assn. of Box and Box Shook Mfrs. of United States.
- Sherman, W. F., General Land Office, Washington, D. C.
- Sherrard, Thos. H., Bureau of Forestry, Washington, D. C.
- Shields, G. O., Editor and Manager *Recreation*; League of American Sportsmen, Delegate-at-large.
- Shoemaker, Samuel M., Stevenson, Md.; State of Maryland.
- Silcox, F. E., Charleston, S. C.; State of South Carolina.
- Silvester, Pres. R. W., Maryland Agricultural College, College Park, Md.; American Forestry Association from Maryland.
- Smith, G. O., U. S. Geological Survey, Washington, D. C.
- Smith, H. A., Bureau of Forestry, Washington, D. C.

S

Smith, Geo. K., Secretary Southern Lumber Mfg. Assn., St. Louis, Mo.; Southern Lumber Manufacturers' Assn., National Lumber Manufacturers' Assn., Western Pine Shippers' Assn.

Snyder, J. M., Bay City, Mich.; American Forestry Association.

Spring, Preston B., Easton, Md.; State of Maryland.

Spring, Prof. Samuel N., Orono, Me.; University of Maine.

Start, Edwin A., Boston, Mass.; Massachusetts Forestry Association.

Steele, Henry M., Macon, Ga.; Central Georgia Ry. Co.

Sterling, E. A., Bureau of Forestry, Washington, D. C.

Sheller, R. H., Tacoma, Wash.; Forest Reserve Service.

Stewart, Elihu, Forestry Branch, Department of Interior, Ottawa, Ontario; Canadian Forestry Assn.

Stewart, Frank, Prescott, Ariz.; Territory of Arizona.

Strong, C. B., General Land Office, Washington, D. C.

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Strong, Miss L. M., General Land Office, Washington, D. C.

Sudworth, Geo. B., Bureau of Forestry, Washington, D. C.

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T

Tennille, A. F., Washington, D. C.; *The American Lumberman*.

Thayer, Hon. Samuel R., Minneapolis, Minn.; Minnesota State Forestry Association.

Thomas, E. B., Los Angeles, Cal.; Forest Reserve Service.

Tompkins, H. J., Washington, D. C.; Bureau of Forestry.

Totten, Mrs. S. G., Washington, D. C.; General Land Office.

Toumey, Prof. J. W., New Haven, Conn.; Yale Forest School.

Tower, G. E., Washington, D. C.; American Forestry Association.

Tremaine, Morris, Buffalo, N. Y.; National Wholesale Lumber Dealers' Association.

U

Underwood, Geo. F., New York city; Water Storage and Manufacturing Association.

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Von Schrenk, Dr. Hermann, Washington, D. C.; Bureau of Forestry.

Van Aiken, C. M., New York city; National Slack Cooperage Assn.

Vreeland, Robert, Frankfort, Ky.; State of Kentucky.

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Wadsworth, W. A., Genesee, N. Y.; State of New York.

Walcott, Dr. Chas. D., Washington, D. C.; U. S. Geological Survey.

Walker, F. B., Washington, D. C.; General Land Office.

Walsh, Thos. F., Washington, D. C.; Denver Chamber of Commerce.

Wantland, C. E., Denver, Colo.; State of Colorado.

Ware, Miss Mary Lee, Boston, Mass.; Massachusetts Forestry Association.

Webster, Jr., N. E., Washington; U. S. Reclamation Service.

Weed, W. H., Washington, D. C.; U. S. Geological Survey.

Wells, Geo. T., Drifton, Pa.; American Forestry Association from Pennsylvania.

Weyerhaeuser, Jr., Fred E., St. Paul, Minn.; Weyerhaeuser Lumber Co. and Miss. Val. Lumberman's Assn.

Wheeler, Mrs. C. H., Boston, Mass.; American Forestry Association.

White, J. B., Kansas City, Mo.; Southern Lumber Manufacturers' Assn.

White, J. W., Portsmouth, Va.; Seaboard Air Line Railway.

Whittlesey, Geo. P., Washington, D. C.; American Forestry Association.

White, Aubrey, Toronto, Canada; Canada.

White, H. D., Enid, Okla.; Territory of Oklahoma.

White, W. H., Warren City, Mich.; Hardwood Manufacturers' Assn.

White, T. Brook, Portland, Ore.; State of Oregon.

Wiggins, Vice-Chancellor B. L., Sevanee, Tenn.; University of the South.

Williams, A. S., Berlin, N. H.; Berlin Mills Co.

Williams, F. B., Patterson, La.; National Lumber Manufacturers' Assn.

- W**
- Williams, Irvin C., Harrisburg, Pa.; Forestry Academy and Pennsylvania Forestry Association.
 Williams, Mrs. L. P., Minneapolis, Minn.; State of Minnesota.
 Williams, Hon. M. M., Little Falls, Minn.; State of Minnesota.
 Wilms, William, Chicago, Ill.; Hardwood Manufacturers' Association.
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 Winchester, A. H., New Orleans, La.; *Lumber Trade Journal*.
 Winchester, Col. A. H., Buckhannon, W. Va.; State of West Virginia.
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 Wood, Richard, Philadelphia, Pa.; Pennsylvania Forestry Association.
 Woodruff, Geo. W., Washington, D. C.; Bureau of Forestry.
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- Ziegler, E. A., Washington, D. C.; Salim Valley Telephone Co.

CONFERENCE OF RECLAMATION ENGINEERS

Important Session of Engineers who Have the Government's Irrigation Work in Charge

REALIZING the importance of the task before the United States Reclamation Service in their work of directing the provisions of the National Reclamation Act of June, 1902, Chief Engineer Newell called a conference of the engineers comprising the service, held in Washington January 3 to 14. The enormity of the task of administering equably the provisions of this Act, affecting immense areas of now arid and semi-arid land, and involving the expenditure of millions of dollars by the Government, is directly in charge of this body of engineers, and the conference in Washington—the second of its kind—was called in order that, by discussion of various phases of their work, and personal intercourse, with a view of further creating an *esprit de corps*, the engineers might be better equipped to cope with the problems before them.

The various subjects discussed included, besides irrigation in recognized relation to the arid lands, irrigation ditch, reservoir, and dam construction, water-laws and the distribution of water, alkali, drainage, cement, con-

crete, measurement of streams, hydroeconomics, etc. For convenience in discussing details of work in various localities and on various subjects, the conference was organized in sections.

The sessions on the opening day included general conferences, with subdivisional meetings of hydrographers and with the Committee on Water-laws and Forms of Water Users' Associations. Mr. Asa Phillips, engineer of the Washington Sewer Department, addressed the general assembly on the concrete and cement constructive work carried on by his department in that city, and a brief address on the importance of the governmental reclamation work in Montana was made by Hon. Joseph M. Dixon, Representative in Congress from that state.

In the section meetings, the hydrographers discussed the limits of accuracy in reporting discharge measurements, in constructing rating tables, and in applying gage heights, introduced by Mr. R. E. Horton, of New York; and methods of counting seconds and revolutions in making low

water measurements, opened by Mr. John C. Hoyt, chief computer.

On the afternoon of the previous day, there was some discussion of the methods of preparing engineering estimates of the actual cost of work accomplished, and the details of the original records for obtaining the facts, in the section of costs and results, and in the general meeting on Thursday afternoon, Mr. Robert S. Person, Auditor for the Interior Department, with several of his assistants, continued in the same line, outlining the subject of auditing accounts.

The most important address of the meeting on Friday, January 6, was Mr. Cyrus C. Babb's discussion of the Milk River project in Montana and its international complications. The problem is a complex one, involving consideration by the state departments of both this country and Canada. Mr. C. J. Blanchard discussed the advertising side of the reclamation work, and suggested improvements in the present system of advertising for bids for construction.

A discussion of "Bench Marks" by Mr. E. Johnson, jr., hydrographer in charge of the Mississippi River district, occupied a meeting of hydrographers; and in the afternoon they were addressed on the subject of "Equipment for Cable Stations," by Mr. E. C. Murphy, inspector of stream gaging.

On Saturday the morning session was principally occupied in discussion of the Snake River Valley in Idaho, and addresses were made by Mr. D. W. Ross, who is in charge of the Government's work in that state, with brief addresses by Senators Dubois and Heyburn, and Representative French. Mr. E. C. Murphy discussed the "Cost of Stream Gaging" at the afternoon session, and Mr. Williams, representing Mr. Willis L. Moore, Chief of the Weather Bureau, made an interesting address. The Truckee-Carson project in Nevada was presented by District Engineer L. H. Taylor, of that state; and Mr. J. C. Hoyt contributed a paper on "The Study of Data by Local Men."

Mr. Thomas H. Means, engineer of

soils, and the foremost authority on alkali, presided over a section of the conference on Monday which discussed one of the most perplexing phases of irrigation work—that is, the duty of water, and the relation of alkali and drainage. The decision finally rendered with reference to the determination of farm units and the amount of water to be used is contained in the following set of rules adopted at the conference:

(1) The farm unit classification shall show in each farm unit the boundary of the irrigable land, and the area of the irrigable land, in acres.

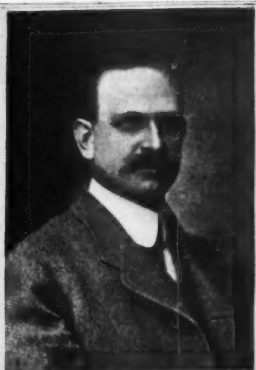
(2) A water right application shall state the number of acre feet per annum to be furnished per acre.

(3) The charge for water rights shall be the same per acre of irrigable land.

(4) The land shall be classified into two grades, irrigable and non-irrigable, and all farm units shall contain the same area of irrigable land as nearly as practicable, except in the case of areas near towns and those susceptible of growing more valuable crops, thus providing for two sizes of irrigable areas in the farm units. The maximum number of acres of irrigable land fixed for each class in a project shall be adhered to as closely as possible.

(5) The charge per acre for water rights on private land shall be the same as for public land, and the irrigable land in each tract shall be determined in the same way as for public land, the irrigable area allowed one man in no case to exceed 160 acres.

The duty of water as generally determined supplies the engineer with the information upon which he can base the size of his storage reservoirs or the amount of land which he can irrigate with his given supply of water. In the design of canals for the delivery of this water, and pumping plants, it becomes necessary, in addition, to know the rate and time of delivery of water to the lands. In each irrigation district there is usually one time of the year when water is used in larger quantities than at any other time in the year. The determination of this time and the maximum amount of



RAYMOND DEWALTER
— OF CH. I. ARIZONA.



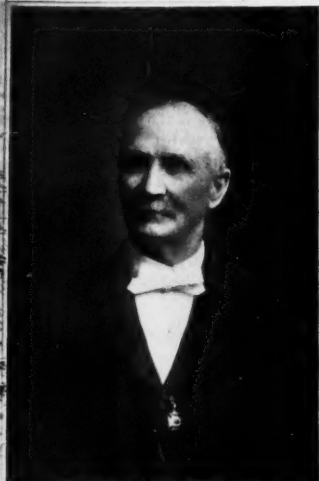
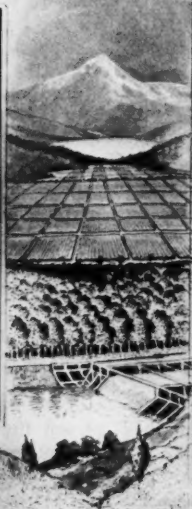
L. C. McCONNELL.
Colorado.



D. A. STOKES
Electrical Expert.



EDMUND T. PERKINS
Engineer and Auditor.



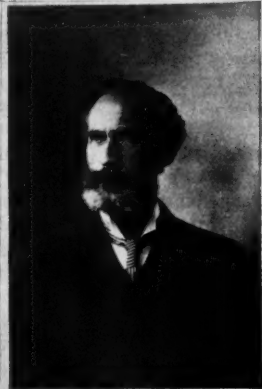
W. D. SANDERS
Consulting Engineer.



E. N. SAVAGE.
Supervising Engineer for Northwest.



T. A. NOBLE.
Washington.



J. H. QUINTON
Consulting Engineer.

water which should be delivered are important in order that the canals can be designed of the proper capacity and pumping plants be given the size and power sufficient to supply the right amount of water needed by the crops.

On the same day, the Belle Fourche project in South Dakota was outlined to the general assembly by Mr. Raymond F. Walter, who has the work in charge. The chief engineer, Mr. Newell, in executive session with the supervising, consulting, and district engineers and experts, discussed the broad principles of construction and cost and the relations which the co-ordinate branches of the service bear to each other. Discussion in detail of constructive work was entered into by the committee on cement and concrete. Computer J. C. Hoyt also discussed the work of the computing section. Stress was laid upon the vital correlation of forestry and irrigation, and the work of the Bureau of Forestry, by Chief Engineer Newell.

By invitation of Chairman Mondell, the conference met the House Committee on Irrigation on Tuesday, and discussion of the Klamath project in California and Oregon was undertaken, Mr. J. B. Lippincott, supervising engineer, of California, leading. Congressional action is necessary to divert the waters which it is intended to use, and the House Committee, which has the bill under advisement, and which is desirous of securing all available information, took advantage of the opportunity of securing all possible data from the engineers in direct charge.

Washington reclamation work was discussed by Mr. T. A. Noble, and the Shoshone project in Wyoming by Mr. H. N. Savage, the former in the morning session, and the latter in the afternoon. Two sections of the conference—the Committee on Water-laws and Forms of Water Users' Associations, and the Committee on Electric Power, Development and Pumping—convened during this session, and discussed the particular phases of the reclamation work they represented.

The entire board of engineers were received by President Roosevelt on Wednesday at 12:15, and the sessions

on that day were given over principally to committee and section conferences, there being no general assembly until 3:30, when the photographic laboratory of the Survey was visited.

Perhaps the most interesting session of the conference occurred on Thursday, when the North Platte (Wyoming and Nebraska) and the Pathfinder projects were discussed at length by Mr. John E. Field, engineer in charge; and details of the work in Wyoming described by Mr. H. N. Savage. The afternoon was devoted to two committee conferences, with the Committee on Methods of Reconnaissance and Survey, and the Committee on Transportation. The latter committee was appointed to go into the matter of railroad rates on the movement of cement and supplies for reclamation work. In the evening, the conference was tendered a reception by its chief engineer, Mr. F. H. Newell, at his home.

On the evening of January 13, the engineers met the employees of the Survey at a smoker tendered them by the Survey. Many distinguished public men were present, and considerable enthusiasm was aroused. The evening's entertainment was purely social, with songs, speeches, and talks by Survey employees and others.

At the closing session of the conference on Saturday, Mr. J. J. Hill, president of the Great Northern Railway, addressed the engineers. Mr. Hill spoke interestingly of the irrigation work, its splendid progress under individual efforts and under the paternal irrigation act, and eulogized the profession of engineering. By invitation, Senator Bard, chairman of the Senate Committee on Irrigation, the chief engineer, and principal supervising and constructing engineers appeared before the committee and discussed several bills of importance to the reclamation work. The rest of the day's session was occupied in final closing discussions of the objects assigned committees and sections, and a general summing up by Mr. Newell.

The American Forest Congress, which was in session during the first week of the conference, was attended

on different occasions, when papers were presented which had particular reference to irrigation. The close relation existing between the forest and the water supply being recognized, several of the engineers were speakers at the Forest Congress, and at such times nearly the entire conference was in attendance, and particularly when Mr. Newell, Mr. A. P. Davis, Mr. Morris Bien, Mr. A. L. Fellows, and Mr. J. B. Lippincott delivered their respective addresses.

The value of the conference to the engineers of the Reclamation Service will be incalculable. The old adage that two heads are better than one is also applicable where there is more than one head to be helped, and more than two to offer suggestions and assistance. Every minute detail of the governmental reclamation work was gone over and discussed thoroughly, and the importance and value to the cause of irrigation in the conferences with the House and Senate committees on irrigation is significant. It shows the interest of the legislative bodies in the governmental reclamation of arid land, and their desire to obtain data

not corrupted or tainted by the land-grabber and schemer.

The list of engineers present included Mr. Arthur P. Davis, assistant chief engineer; Mr. J. B. Lippincott, supervising engineer for California; Mr. H. N. Savage, supervising engineer for Northwest; Mr. J. H. Quinton, consulting engineer; Mr. W. H. Sanders, consulting engineer; Mr. O. H. Ensign, electrical expert for the Pacific coast; Mr. H. A. Storrs, electrical expert for Rocky Mountain region; Mr. Morris Bien, supervising engineer and legal adviser; Mr. Thomas H. Means, engineer of soils; Mr. Charles H. Fitch, supervising engineer, and chairman of Auditing Committee; Mr. Edmund T. Perkins, engineer and auditor; Mr. George A. Hammond, superintendent of drilling; Mr. Louis C. Hill, supervising engineer, Arizona; Mr. I. C. McConnell, Colorado; Mr. D. W. Ross, Idaho; Mr. Cyrus C. Babb and Mr. S. B. Robbins, Montana; Mr. J. E. Field, Nebraska; Mr. L. H. Taylor, Nevada; Mr. Raymond F. Walter, South Dakota; Mr. T. A. Noble, Washington.

REPORT OF THE DIRECTORS OF THE AMERICAN FORESTRY ASSO- CIATION, 1904

THE Board of Directors of The American Forestry Association, in accordance with its custom, begs to submit the following report, which is intended to be a resumé of the more striking events in connection with the development of forestry in the United States during the preceding year, and a review of the status of the forestry movement in the United States at the present time.

No better indication of the advance of the ideas which this Association has stood for and labored to advance during the past twenty-three years could be shown than the holding of such a meeting as this Congress, where repre-

sentatives of all interests having to do, either with the *production* or the *use* of forests, have gathered from all parts of the land to see in what way this fundamental necessity of national life may be promoted. When this Association was organized, hard-headed business men looked upon it as an organization composed largely of sentimentalists, and it is only within a comparatively few years that the great consumers of forest products have realized that we advocate not forest preservation only, but forest preservation by wise use. But economic laws in this country, as everywhere else, have worked out their inevitable re-

sult, so that with diminishing supplies the importance of an economical use of the forest is now widely recognized, and we may reasonably claim that public sentiment now so strongly sustains all sound movements for forest preservation that we need fear no abandonment or diminution of the forest policy inaugurated by the United States and the various states. When the first great federal forest reservations were proclaimed in the far West, the opposition to them by the people in the various localities where they were created was well-nigh unanimous. Today we can point to an almost complete reversal of this sentiment. In no small part is this due to the appreciation that water conditions can best be maintained by preservation of the forests, and with the growing importance of irrigation the strength of the support of the forest reservation policy will also grow.

The most important facts in connection with the development of forestry in the United States during the last year are: First, the steady and rapid progress which commercial forestry is making in consequence of the growing recognition by lumbermen that conservative lumbering offers definite business advantages, to which, as business men, they must give careful consideration, and that the day is rapidly approaching when the failure to practice forestry will mean for many of them the extinction of their business; second, the substantial advance which has been made toward securing forever for the people those portions of the public lands which will make their largest contribution to the public welfare as permanent forests; third, the recognition by many of the states, who have not been interested heretofore, of their duties and opportunities in respect to the maintenance or extension of their forests, resulting in definite and comprehensive state forest policies.

MEMBERSHIP OF THE ASSOCIATION.

With the growth of forestry in this country, this Association also must grow; or, to state it in what was certainly the true terms until 1896, this

Association by its efforts in no small part brought forestry before the public and its practice into existence here, and so grew itself with the growing interest in the subject.

The enthusiasts of the '80's numbered only between two and three hundred, and their propaganda seemed almost hopeless. But the work did tell in time, and the Association steadily grew, until we now number ten times what we did fifteen years ago.

A year ago our annual membership amounted to 1,970. Through deaths, resignations, and those dropped for non-payment of dues or otherwise, we lost during the past year 173, and we gained 262 new members, making the net gain in annual membership for the year 89 members, so that our annual membership on December 1, 1904, was 2,059. Adding to these: Sustaining members, 17; Life members, 121; Patrons, 2, we had at that date 2,199 members. This membership is scattered throughout the country, every state and territory except one being represented. A gratifying feature of the past year has been the considerable number of Forest officers who have joined the Association. As we have often stated before, we ought to have 10,000 members, and the only way we can obtain such membership is through the active co-operation of all of our members. We have made arrangements for a campaign during the coming year, by which it is hoped we may add several thousand to our membership. The influence of such a body of public-spirited citizens actively exercised in behalf of forestry cannot be overestimated, and we should make every effort to largely increase our membership; for, steady as has been the growth of the Association, it still falls far short of a membership commensurate with the national importance of the forest movement which it advocates.

WORK OF THE BUREAU OF FORESTRY.

The activities of the Bureau of Forestry are so numerous, varied and far-reaching that it is impossible in a report of this character to more than touch upon a few of its most important

acts. The growth and usefulness of the Bureau has been phenomenal, and especially gratifying is the wide public recognition of the fact that this is a practical bureau as well as a scientific one. Lumbermen and forest owners are engaged in a practical business, and for them forestry is of interest and importance only as a question of business. The Bureau, recognizing this fact, has put itself in close and useful touch with both the producers and consumers of the forest.

The Bureau has received applications for assistance from land owners, who desire to secure for their forest holdings the best care, covering total areas of 8,000,000 acres. It now has under its management 20,000 acres in woodlots and 500,000 acres of timber tracts, while working plans have been prepared by the Bureau for 823,000 more acres, and working plans are now in preparation for an area aggregating 3,578,514 acres. The tracts involved are widely scattered, including lands in the Southern pine regions, the Lake State pineries, the Pacific Northwest, and the broad-leaf forests in the lower Mississippi Valley.

The advance of forestry where economic and commercial advantages are involved is rapid, for the larger private interests are keenly alive to whatever promises to be of value to them, and are able to look forward into future conditions. With the owners of small forest acres, whose woodlots constitute a vast area when considered in the aggregate, forestry takes hold slowly. They must be convinced of the benefits afforded them by its practice, and so the forester must go to them. When the time comes, however, that sound methods of cutting on the woodlots have established themselves in the traditional practice of farming handed down from father to son, we shall see an enormously increased production for such woodlands. The Bureau of Forestry, recognizing that this is a matter of prime importance and directly in line with the purposes for which the Department of Agriculture was created, has entered this field with the definite purpose of continuing in it until woodlot management shall have

become as truly a part of farm practice as skillful methods of securing field crops.

EXAMINATIONS OF NATIONAL FOREST RESERVATIONS.

The forest reservations of the United States at present afford the greatest single opportunity for the introduction of the practice of scientific forestry; and the importance of properly fixing their boundaries and examining the character of timber growth within them cannot be overestimated. In this work the Bureau of Forestry has continued during the past year to perform the excellent service of previous years. The creation of new reserves and additions to old reserves require the expert examination of the foresters from the Bureau, before being finally proclaimed by the President, and the wise practice of withdrawing temporarily such areas as seem probably of such a character that they should be made forest reservations upon recommendation of these officers, gives good ground for confidence that the nation will not lose the forest lands which it ought to guard through any lack of early information.

In connection with the reservations of the government, forest planting and experiments therein have been continued under the direction of the Bureau with a view to arriving at such methods as will reduce the cost to such a basis as to make this feasible on an extensive scale, where the same is needed within the forest reservations.

Another line of work of the utmost importance is the continued investigation of the Bureau in connection with the available supply of timber for railroad ties. The question of a cheap and still abundant material for this purpose, in view of the rapidly dwindling supplies, grows more important every year. With this aim in view, the study of the loblolly pine, which has been carried on in many parts of the South, was taken up in Texas, where the great area of young growth of loblolly pine furnished for this purpose an unexcelled opportunity.

This investigation considered the questions of raising tie timber of this

character as a permanent investment, and the possibilities of avoiding waste in tie-making, as well as the introduction of economical methods of management of loblolly pine forests for ties. These studies promise to prove of great practical value.

In co-operation with several of the great railroads, the Bureau of Forestry is conducting other studies, both of the sources of supply of railroad ties and construction timbers and of the best methods for their preservative treatment. These studies offer tangible promise of economy by railroads, both through the use of the inferior timbers, rendered possible by preservative treatment, and also through the application of conservative methods in the woods, thus decreasing materially the drain upon our forests.

The methods of turpentine orcharding introduced by the Bureau in the South have brilliantly justified themselves. It is estimated that the Bureau's service in this line has added to the annual naval stores' product an increased value of \$7,000,000, and at the same time removed the greatest single cause of the destruction of the turpentine orchards. The total amount expended in accomplishing this result was but \$14,000.

SCIENTIFIC WORK OF THE BUREAU OF FORESTRY.

Upon the scientific side the Bureau of Forestry has continued its investigations to determine the strength and durability of the merchantable timbers of the United States. These mechanical tests have been carried on at Berkeley, Cal.; Lafayette, Ind.; New Haven, Conn.; St. Louis, Mo., and Washington, D. C., where the properties of red fir, western hemlock, red gum, long-leaf pine, and loblolly pine have been and still are under investigation. Reliable data on the structural value of the timber of the country is limited, and the purpose of these investigations is to supply engineers and architects with complete information on the mechanical properties of merchantable timbers, showing the effect of natural defects on the strength of the timber, the rate of growth, and the

moisture content to the strength, especially as applied to the larger timbers. Such a work must necessarily occupy a series of years, but when completed will be of inestimable value.

The year 1904 saw several new seasoning stations established in different parts of the country, where extensive investigations are now being conducted as to the seasoning and preservation of timber. Particular attention has been paid to determining the effect of treatment with various preservatives upon the strength of timber, and it has been shown that the preliminary steaming usually practiced reduced the strength of timber materially, and also that the preservative itself has much the same effect upon the strength of timber that water has.

SALES OF TIMBER.

No better argument for the repeal of the Timber and Stone Act, and in lieu thereof the passage of legislation authorizing the sale of matured timber upon the public lands generally, could be wished for than is to be found in the results obtained from the sales of timber on the Chippewa Indian Reservation in Minnesota. Under special provisions of the act authorizing the disposition of this timber, it was to be advertised and sold to the highest bidder, after a careful estimate of the timber on these lands had been made, and no bid was to be accepted for less than the estimated value of the timber. The results of this method were that the timber was sold at the first sale, December 5, 1903, at an average price of \$13.90 per acre, and at the second sale, December 28, 1903, at an average price of \$16.70 per acre, the average price of both sales being \$15.06 per acre for the timber alone, the title to the land being retained by the government for subsequent disposition. Under the Timber and Stone Act both land and timber would have been sold for \$2.50 per acre. That is, the government has received, or will receive, from these sales of timber \$2,650,903; while under the Timber and Stone Act it would have received only the sum of \$438,707 for both land and timber. In this connection it must not be forgotten that

under the second sale 5 per cent. of the timber was reserved for the purpose of insuring the reforestation of this land.

What was accomplished in connection with the sale of this Indian timber can just as well be accomplished with reference to the matured timber on the public domain. To effect this, however, the Timber and Stone Act *must* be repealed.

We also commend the proposition that contemplates the passage of such legislation as will authorize the establishment of national parks, for the purpose of preserving natural wonders, by proclamation of the President, in much the same way as the forest reservations are now proclaimed under the Act of March 3, 1891.

FOREST FIRES.

Were it not that the importance of the subject demands it, we should pass over the well-worn and tiresome subject of the destruction wrought by forest fires. In the press generally, as well as in forestry publications, the wanton waste of our timber resources from this cause, far exceeding in the total all legitimate consumption, has been dwelt upon year after year; and yet this loss still continues, when increased care would reduce it materially.

To take only the reported fires of the past three months, we find that they have raged in the following states:

Oregon suffered severely in September and October by numerous fires. One fire is reported by timber men to have destroyed \$8,000,000 worth of timber in Columbia county.

Washington had numerous destructive fires during the same two months, in one case a detail of troops from Vancouver Barracks being ordered out to assist in suppressing the fire. At the head of Lake Washington some 7,000 acres were burned over.

In Montana fires of considerable size occurred in all of the past three months, in some cases clearly due to carelessness, and much game was destroyed and driven from the forests.

California has also been a severe

sufferer, as fires from all parts of the state were reported in September, October and November, in one case the Government Forestry Experiment Station in Santa Monica Canyon being injured to the extent of \$5,000.

Arkansas sustained probably the greatest losses in November of any of the states.

Not to go into detail, Indiana, Illinois, Ohio, Kentucky, Missouri, Tennessee, Texas, Colorado, Idaho, Georgia, Virginia, West Virginia, Pennsylvania, New Jersey, Kansas, and Indian Territory all report losses of greater or less magnitude.

FOREST WORK OF THE GENERAL LAND OFFICE.

As is well known, at present, the General Land Office, under the supervision of the Secretary of the Interior, is charged with the responsibility of administering and protecting the Federal Forest Reservations. This has grown to be a very important part of the work of that office, and the Commissioner's annual report deals extensively with the subject. Considering that this branch of the service has only been in operation for the past six years, and that it had to be created *de novo*, we feel that the office is entitled to our commendation for what it has done in the face of very great difficulties.

The Forest Reserves of the United States now number sixty-one, and embrace a total area of 63,348,656 acres, being an increase in the area of forest reserves since June 30, 1903, of 585,162 acres. During this period there have been eleven new forest reserves created, and one has been abandoned (the Crow Creek Forest Reserve, in Wyoming). The areas of four reserves have been somewhat reduced, two have been enlarged, and two have been consolidated. To properly administer this vast area requires constant patrolling to suppress incipient fires and to apprehend timber trespassers. Under the appropriations for this purpose during the past year it has been possible to employ at any one time 484 rangers as the highest number, who were placed in the field at the

periods when danger from fire was greatest. During the winter months many of these were furloughed, so that at one time the number employed was only 200. A comparison of the figures showing the enormous acreage of these reservations and the number of rangers now employed in protecting them must show to anyone how inadequate the existing force is. This is especially true when we consider that means of rapid communication within the reservations are very slight and growing less. Formerly the trails were kept open by those travelling through the regions now in reservation on business of various sorts. Such travel decreases after the reservations are created, and as a consequence the roads and trails become less passable owing to fallen timber and other obstacles. Recognizing the necessity for rapid communication within the reserves, this Association passed a resolution at its annual session, in December, 1903, calling upon Congress to appropriate \$500,000 to be used in the improvement of roads and trails within the forest reservations. The matter was presented to Congress by the Secretary of the Treasury, with recommendations of the Secretaries of Agriculture and the Interior that an appropriation of \$50,000 be at once made for this purpose, but too late in the session to obtain favorable action. It is earnestly hoped that some appropriation for this purpose may be made by the present Congress.

That the Forest Rangers are very successful in extinguishing fires appears from the report of the General Land Office, which shows that during the past year 231 fires which had passed the incipient stage were extinguished—a decrease from the prior year of forty-eight in this class of fires. Owing to the constant patrolling, the number of fires passing the incipient stage diminishes year by year.

The grazing privilege within the forest reservations is one of the most valuable to the public, and at the same time one of the most difficult to administer, keeping in view both the purposes of the reservations and the general public good. Under the system

now prevailing of issuing permits, when it is shown that such grazing will not injuriously affect the young growth of timber on the reservations, there seems to have been devised a fairly satisfactory plan. There have been issued 843 permits to graze 1,806,722 head of sheep in twenty of the reservations, and 5,822 permits to graze 610,091 head of cattle and horses in forty-eight of them. Sixteen conditional permits to graze sheep to the number of 38,100 in the Washington Forest Reserve were issued by the Secretary of the Interior, which were not to be delivered unless the Forest Superintendent found that the grazing areas desired by the sheep owners could properly be so used. Six permits were also issued to allow 16,100 head of sheep to cross reserves in order that they might reach private lands within the Sierra Forest Reserve. In furtherance of the determination of the department not to allow the forest reserves to interfere with the transaction of any proper business, permits of a temporary character have been granted allowing stock to cross certain reserves to reach necessary shipping points and for other proper purposes.

A bill providing for the punishment of persons pasturing stock within forest reservations without a permit has been recommended by the Secretary of the Interior, and some such measure should certainly be passed. Other legislation necessary for the good administration of the reserves is that authority should be conferred upon forest officers to make arrests for violation of the laws and regulations relating to forest reservations. Such a measure was introduced in the House of Representatives at the last session of Congress (Bill H. R. No. 7396) and received favorable action in that body. It is to be hoped that the Senate will pass this bill before the adjournment of the present Congress.

SALES OF TIMBER WITHIN FOREST RESERVATIONS

The policy of selling the mature, dead, and down timber within the forest reservations has justified itself and is constantly increasing. During the

past year 377 sales have been effected, from which \$58,436.19 were realized from such sales; in addition to which there is now a large amount arising from such sales in the hands of the receivers of public monies at the local land offices. This is the largest amount thus far sold since such sales were authorized. These sales, combined with the privilege allowed settlers to take without cost for their individual use timber from the forest reserves for domestic purposes, have resulted in clearing the reserves of much dead and down timber, and in every way improved their condition. A much larger revenue might be obtained from the forest reservations if grazing and other privileges, such as the location of saw mills, hotels, summer resorts, etc., within the reservations were made to pay a reasonable amount for such privileges. This Association has always contended that the forest reservations of the United States could and ought to be made self-sustaining, and that all the revenues derived therefrom should be expended in developing the reservations with the idea of constantly improving the character of the forest and thus insuring adequate timber supplies for future generations. We therefore urge that all monies derived from the sale of timber on forest reservations, or revenues of any description from the sale of privileges within the reservations should be set aside as a special fund in the Treasury of the United States, to be paid out upon proper requisition of the head of the department administering the reserves to be expended for the improvement of the reservations.

We also wish to renew our recommendations, contained in the resolutions which were adopted at the annual meeting of this Association in December, 1903, concerning the modification of the mineral land laws, of the lieu land-selection law, and the repeal of the Timber and Stone Act.

CONSOLIDATION OF FOREST WORK OF THE UNITED STATES.

When there is such unanimity of opinion as exists concerning the necessity of consolidating all the forest

work of the Federal Government in the Bureau of Forestry, it seems hardly possible that the necessary legislation should be much longer delayed, and we have great gratification in reporting that a bill for transferring the management and control of the United States Forest Reserves from the General Land Office to the Bureau of Forestry passed the House of Representatives at this Congress on the 12th of December, 1904. With the President, both the Secretaries of Agriculture and of the Interior, and the Commissioner of the General Land Office, all uniting to urge this legislation, we may reasonably expect that the Senate will concur in making the proposed legislation a law. (Query: Does the present bill provide for anything more than the transfer of the reserves to the Bureau of Forestry?).

IRRIGATION.

General interest in the work of the Association has been greatly stimulated in the West through the active surveys and construction of large works of reclamation under the terms of the Act of June 17, 1902. This Act sets aside the proceeds of the disposal of public lands, about \$25,000,000 at present. This money is being used in the construction of large irrigation works, the cost of which is to be returned to the government in ten annual installments and the money used over again. The necessity of protecting these works from floods and from the washing of earth from the hillsides has emphasized the need of good forest management. It is believed that in the future the work of the Association will be of very great advantage in the carrying out of the purpose and intent of this Reclamation Act.

FOREST WORK OF THE STATES.

As indicative of the growing interest and strength of the forestry movement, the co-operation of the Bureau, at the request of the states, with the states of California, Massachusetts, and New Hampshire is significant. In California the joint work of the state and the Bureau of Forestry in studying its forests has been completed and

a model state forest law has been drawn. The co-operative study of the White Mountain region of New Hampshire has been completed.

Without attempting to recite what is being done in all the states, the achievements of the state of Pennsylvania, which was among the earliest to appreciate the importance of the forest problem, are noteworthy. During the past six months that state has purchased over 100,000 acres of land for forest purposes, making such state holdings now aggregate about 600,000 acres; and it is the purpose of the state to procure a million acres at the earliest possible moment. The State Forest Academy, which has been in existence only two years, has at this time twenty students preparing for practical forest work of the state. Upon the philanthropic side the state has in this connection established a Camp Sanatorium with gratifying results.

Wisconsin and Massachusetts are following a definite forest policy through the employment of state foresters under forest acts passed at the last sessions of their legislatures. Maine, with the aid of the Bureau of Forestry, under her Forestry Commissioner, is solving her urgent forest problems.

In Michigan, under the previously established Forest Commission, forestry has made great advances during the past year. Forest reserves on lands derived from tax sales have been created, amounting to 35,000 acres, where a regular system of fire protection, with rangers and foresters, has been inaugurated under the warden of the reserves, who is the professor of forestry at the State University. Planting, road construction, fire lines, the regulation of grazing, are also in successful operation on these reserved lands. The interest of the people of the state is now sufficiently aroused to promise the passage of needed regulation.

The most important step taken in New York state is the passage of a law conferring authority to employ fire patrols to any number needed in anticipation of fires at dangerous periods in

the state reserves. Planting is also being done on the state lands and will be extensively continued this year.

PHILIPPINES.

The forest work done in the Philippines is a good example of what we might have done with the timber lands of the Public Domain. The Forestry Department there, established only four years ago, last year obtained a revenue from the sales of timber of \$300,000, or four times as much as the greatest amount obtained while under Spanish rule. The department now has sixty permanent stations scattered throughout the islands, and employs 230 men.

CANADIAN FORESTS AND FORESTRY.

The great area of timbered land in Canada, estimated at 300,000,000 acres of merchantable timber, demands our attention. The value of the exports of wood and manufactures thereof for the fiscal year ending June 30, 1903, was, in round numbers, \$40,000,000, and of this about \$19,000,000 worth came to the United States, or \$100,000 more than what was exported to Great Britain. Within recent years forest reserves have, at different times, been set aside by the Dominion government, and also by some of the provinces. At present the aggregate area of Dominion reserves is about 18,700,000 acres. A system of patrol for protecting the forests against fire, both within and outside the reserves, is now in operation both on federal and provincial land and has proved of great value in lessening the annual loss from forest fires.

FOREST TREE PLANTING ON THE PRAIRIES.

In the Spring of 1901 a commencement was made in forest tree planting on the plains in Manitoba and the Northwest Territories under a system of co-operation between the federal government and the settlers, and is being attended by excellent results. Over 3,000,000 trees have been planted, and of this number 1,800,000 were planted in 1904.

AFFILIATION WITH OTHER FORESTRY ASSOCIATIONS.

While a number of efforts to effect some consolidation of state associations with this Association have been made during the past year, no practical method of accomplishing this very desirable purpose has been developed, and it is hoped that during this Congress, where so many state associations are represented, some plan may be formulated for the establishment of closer relations of state and local forestry organizations with this Association. A special committee of this Association is prepared to submit a tentative plan, having this object in view, at a special meeting of those interested, to be held in connection with this Congress.

THE MAGAZINE.

In creating an official organ the Association took a wise step. Through our magazine, FORESTRY AND IRRIGATION, we are able not only to keep our members in touch with the forestry movement, but it is also valuable in constantly obtaining new members and in widening the sphere of our influence. During the past year 3,000 copies per month were issued and regularly sent to all of our members, the surplus being used in obtaining new members and in endeavoring to interest others outside of the Association. The total cost to the Association was \$3,509.25.

FOREST SCHOOLS.

The increase both in the number of forest schools and of the students in attendance is a sure indication of the growing interest in Forestry. The fact that it now offers a career for young men makes certain that the needed men will be trained, and there will be use for the training.

At the Yale Forest School, now the oldest distinctively forest school since Cornell University abandoned its forest school, there are sixty-three students in attendance. These students are also joined at Milford, Pa., by those of the summer school of the university for practical forest work during the summer.

The Harvard Forest School has been doing successful work during this, its second, year.

At Biltmore, N. C., Dr. Schenck continues his forest school in connection with the Vanderbilt estate, having fifteen students this year. An extensive tract, some 15,000 acres, is to be reforested by stock raised on the estate.

Michigan Agricultural College has fifteen men taking the full forestry course and twenty-three men doing elementary work in forestry in the freshman class; while at the University of Michigan Professor Roth reports an increased attendance of forest students over last year.

The University of Maine has forty-five undergraduates taking a course in forestry, some of whom intend making it their profession.

In the Iowa State College of Agriculture and Mechanic Arts additional courses have just been established in response to the increased interest in forestry.

The University of Minnesota now offers a full four-year course in forestry, with a degree of equal importance to those granted for other sciences by the university.

By these opportunities, and those furnished in other schools and colleges, men are being prepared all over the country to take charge of private forest properties, or for government service at home or in the Philippines, where the United States early established a forest service, or to act as teachers in what is to us a new science and art.

This necessarily abbreviated review of the forest work of the past year, it seems to us, can have only one impression, and that is, how vigorously this subject has taken hold of our people and how certainly it will grow from year to year.

What this Association had at first to fight for—to obtain any recognition of the necessity for its existence—is so well assured that it can now only hasten to its perfect consummation.

And so we close this report with words of congratulation to our members for what they have accomplished.

REPORT OF THE TREASURER

For Fiscal Year ended November 30, 1904.

Otto Luebker, Treasurer, in Account with the American Forestry Association.

DR.		CR.	
To Balance, December 1st, 1903....	\$488 72	By "Forestry and Irrigation," December, 1903, to November, 1904, inclusive.....	\$3,509 25
Interest on bonds.....	180 00	Postage.....	150 00
Interest on deposits.....	19 54	Salary of Treasurer and clerk hire.....	219 35
Dues, annual memberships.....	3,646 03	Interest on demand loan.....	25 25
Dues, sustaining memberships.....	350 00	Expense of summer meeting, Minneapolis, 1903.....	50 00
Life memberships.....	400 00	Printing and stationery.....	264 80
Donations.....	3 00	Payments on demand loan.....	800 00
Exchange on remittances.....	2 69	To bank, to make good a bad check (Contra).....	4 00
To make good a bad check (Contra).....	4 00	Refund of dues, overpaid.....	2 00
		Sundries.....	8 25
			\$5,032 90
		Balance, December 1, 1904.	61 08
	\$5,093 98		\$5,093 98

Special Fund for Secretary.

DR.		CR.	
To balance, December 1st, 1903....	\$1,500 00	By Edward A. Bowers, for Secretary's expenses.....	\$500 00
Contribution, Elizabeth S. Potter.....	1,000 00	Expenses American Forest Congress, Washington, January 2-6, 1905.....	500 00
Interest on deposit.....	31 75		\$1,000 00
	\$2,531 75	Balance December 1, 1904.	1,531 75
			\$2,531 75

Additional Assets.

DR.		CR.	
Two Chicago and Eastern Illinois 5 per cent bonds (purchase price)	\$2,305 00	Balance of loan on one Chicago and Eastern Illinois bond.....	\$200 00
Two Minneapolis and St. Louis R. R. 4 per cent bonds (purchase price).....	1,982 50	Net additional assets subject to realization.....	4 901 50
Dues outstanding—			
Annual membership.....	764 00		
Sustaining memberships.....	50 00		
	\$5,101 50		\$5,101 50

It will be seen from the Statement of Receipts and Disbursements that the Demand Loan, which was \$1,000 at the beginning of the year, has been reduced to \$200. It will be apparent from the foregoing that while the cash balance at this date is about \$400 less than a year ago, an actual *gain* of about \$400 has been made during the year.

Unpaid dues to the amount of \$814 are outstanding. Namely, for annual memberships \$764 and Sustaining memberships \$50. The Annual dues outstanding are as follows:

For 1904.....	\$532 00
For 1903.....	228 00
For 1902.....	4 00
	<hr/>
	\$764 00

One Sustaining Member, elected the latter part of the fiscal year 1903, was credited with 1903 dues paid.

On March 1, 1904, 40 members were dropped for non-payment of dues, the amount thus lost being \$200

Respectfully submitted,

OTTO LUEBKERT,
Treasurer.

WASHINGTON, D. C., *December 1, 1904.*

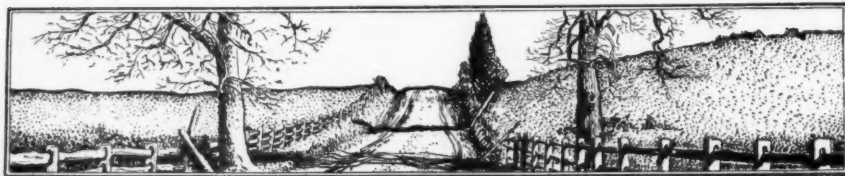
CONFERENCE OF FOREST OFFICIALS

Valuable Meetings at Washington of Members
of General Land Office, Forest Reserve Officers,
and Representatives of the Bureau of Forestry

DURING the week immediately following the Forest Congress, a series of daily conferences were held at the residence of Mr. Gifford Pinchot between the forest supervisors who were attending the Congress, members of Division R of the General Land Office, and members of the Bureau of Forestry. The object of the conferences was to discuss the various problems arising in connection with the administration of the forest reserves; to get an exchange of ideas between the field and office force; to suggest necessary changes in the regulations, and in general to talk over the details of the field work and devise plans for its improvement.

Among the men participating in the conference were the following: Inspectors H. D. Langille and R. H. Charlton, Superintendents Maj. F. A. Fenn and D. B. Sheller, Supervisors

Frank Stewart, of the Prescott Forest Reserve, Arizona; J. B. Seely, of the Madison Forest Reserve, Montana; L. G. Davis, of the Medicine Bow Forest Reserve, Wyoming; A. W. Jensen, of the Manti Forest Reserve, Utah; F. S. Breen, of the San Francisco Mountains Forest Reserve, Arizona; R. C. McClure, of the Gila Forest Reserve, New Mexico; Clement Hightower, of the Lincoln Forest Reserve, New Mexico; E. B. Thomas, of the San Bernardino Forest Reserve, California. Also Mr. H. H. Jones, chief of Division R; J. T. Murphy, J. D. Leland, Capt. J. B. Satterlee, Blake Franklin, of the General Land Office; and Mr. Pinchot, F. E. Olmsted, E. T. Allen, Overton W. Price, T. H. Sherrard, C. Dubois, Hareford, Hatton, Elers Koch, Franklin W. Reed, H. J. Tompkins, G. E. Tower, Wilson, and A. F. Potter, of the Bureau of Forestry.



LECTURES ON FORESTRY

Special Course Given in Washington,
January 7--13, by Yale Forest School

TAKING advantage of an unusual opportunity for bringing its students into touch with the leaders of the forest movement, the management of the Yale Forest School held a series of interesting lectures in the assembly hall of the Bureau of Forestry, Washington, D. C., January 7 to 13. The students of the school had attended the American Forest Congress the week previous, and remained over for these lectures as part of their regular work. In addition, the various members of the Bureau of Forestry and the delegates to the Forest Congress were invited to attend these lectures.

Mr. Gifford Pinchot, forester of the United States Department of Agriculture, delivered a series of four exceedingly valuable lectures on "Forest Policy." On the opening day, January 7, in addition to Mr. Pinchot's lecture, Captain George P. Ahern gave an interesting talk on the Philippines. There were also impromptu addresses of interest and value from Dr. B. E. Fernow, Prof. Filibert Roth, and Dr.

Judson F. Clark, of the Canadian Forest Service.

Five lectures on "Hydrography," illustrated with lantern slides, were given by Mr. F. H. Newell, chief engineer of the Reclamation Service. On Monday, January 9, Mr. Frederick V. Coville, botanist of the United States Department of Agriculture, and Mr. A. F. Potter, grazing expert, Bureau of Forestry, spoke on the "Grazing Problem." "Forest Reserves" were discussed by Mr. F. E. Olmsted on Tuesday, January 10. On January 11 Mr. George B. Sudworth lectured on "Dendrology," while Mr. T. H. Sherrard spoke on "Bureau Methods," his talk being supplemented with addresses by Mr. H. H. Chapman, Mr. A. K. Chittenden, and Mr. C. S. Chapman, all of the Bureau of Forestry. Two lectures worthy of special mention were delivered on January 12, by Mr. William L. Hall, whose subject was "Forest Extension," and by Mr. Raphael Zon, on "Silvicultural Research."

SOUTHERN APPALACHIAN FORESTS

Cooperative Study of their Resources and Needs Made by State of
North Carolina, U. S. Geological Survey, and Bureau of Forestry

THE forest conditions of a large area in the Southern Appalachian Mountains were examined in 1900 and 1901 by H. B. Ayres and W. W. Ashe, of the United States Geological Survey. The examination was made at the joint expense and under the joint supervision of the United States Geological Survey, represented by Mr. Henry Gannett, geographer; the Geological Survey of North Carolina, represented

by Prof. J. A. Holmes, state geologist, and of the Bureau of Forestry of the Department of Agriculture, represented by Mr. Gifford Pinchot, forester. The report made by Messrs. Ayres and Ashe has recently been published by the United States Geological Survey and contains much matter of general interest.

The portion of the Appalachian region under consideration extends from

Virginia southwestward, and comprises parts of North and South Carolina, Tennessee, and Georgia, between the Piedmont Plateau on the southeast and the Appalachian valley on the northwest. It consists of two parallel mountain chains, the Unaka on the northwest and the Blue Ridge on the southeast, and the intermediate mountains and valleys, some parallel, others at right angles to the Blue Ridge. The region examined in 1900 and 1901 comprises an area of approximately 10,000 square miles between New River Gap in Virginia and Hiwassee River in western North Carolina and northern Georgia, and has an approximate length of 190 miles and a varying width of 35 to 65 miles. The forests in this area have an important influence on the climate and the supply of water and timber in all the territory between the Ohio River and the Atlantic and Gulf coasts. Whatever concerns the forests is, therefore, of economic interest, not merely to the 318,000 people who live in this region, but to a population far beyond its borders as well.

The distinctive factors which give value to this mountain region are a temperate and healthful climate; grand and varied scenery; a plentiful supply of cool water; abundant water power; mineral deposits of iron, copper, mica, talc, gold, corundum, precious stones, kaolin and other clays, and building stone; soils that are generally of good physical and chemical composition; and a vast extent of forest, principally hardwood, consisting of 137 species of trees, many of which yield lumber and bark. Up to the present time these resources have been developed by individuals in a wasteful and unsatisfactory manner.

The original forest of this region, as indicated by the preserved remnants and by the accounts of old settlers and early explorers must have been won-

derful in the extent, density, size, and quality of its timber trees, and the variety of its species. The agencies that have wrought changes in these forests are fire, lumbering, clearing of lands for farming, and the grazing of cattle and sheep.

Evidence of forest fires is found over approximately 4,500,000 acres, or 80 per cent. of the entire area. Great damage has been done, year after year, by light fires that have scorched the roots of timber trees, destroyed seedlings so that the forest cannot reproduce itself, consumed forest litter and humus, and reduced the thatch of leaves which breaks the force of the rain.

The lumberman is growing more active in this region, going every year farther into the forest. In most places, however, the continuity of the forest has not yet been broken, as only the most valuable of the trees have been taken out.

Surpassing both fire and lumbering in the completeness and permanency of the damage done is the clearing for ordinary agricultural purposes of mountain lands which are not worth cultivating and should forever remain in forest. A few years of cultivation usually exhausts these lands and they are soon abandoned. Denuded of their forests they are rapidly washed away.

Great damage is also done to the forest by grazing cattle. Young growth has been prevented, and the hardening of the ground and the removal of debris and humus have promoted a rapid run-off of rain and water and prevented its percolation into the ground as a reserve for dry times.

If the best methods of silviculture were applied at once, the remaining forest would undoubtedly yield handsome returns. The most pressing need of the region is railroads, which would make the timber accessible.



STATE IRRIGATION LAWS

BY

MORRIS BIEN

Consulting Engineer, U. S. Reclamation Service

If the operations of the Reclamation Service have done nothing else, their effect in developing an active movement toward the improvement of the irrigation legislation of a number of the arid states would be considered a great achievement for the short period of its existence. The inauguration of a large system of development by federal authority for the construction of irrigation works in the various states and territories of the arid region has shown to the people in general, as nothing else could, the absolute necessity for improvement in the methods of acquiring title to the use of water and in protecting such rights. The states of Wyoming, Nebraska, and Utah had taken action in this direction before the passage of the Reclamation Act.

The time between the passage of the act and the next meeting of the various legislatures was but six months, so that but little opportunity was available for perfecting plans in this direction. However, the officers of the Reclamation Service were frequently asked during that winter to suggest improvements in legislation. Experience under the Reclamation Act had been so limited that conditions had not sufficiently developed to form the basis of definite recommendations and suggestions.

NEVADA LEGISLATION.

Nevertheless, the State of Nevada immediately took steps in this direction as a result of the passage of the Reclamation Act, and with commendable promptness passed an irrigation law which incorporates many valuable provisions looking to the definite ascertainment and protection of rights to the use of water.

OREGON AND WASHINGTON IRRIGATION COMMISSION.

During the early part of last year commissions were appointed in Oregon and Washington to formulate plans for state irrigation codes to be reported to the legislatures of the two states. These commissions conferred with the members of the Reclamation Service and many others interested in this line of work and have developed codes which are now before the legislatures of the two states. It has not been possible to give these drafts careful study at the present time, but the indications are that the code presented to the legislature of the State of Washington will, with some modifications which it is hoped will be adopted, serve admirably as a basis for the irrigation development of the state. Less is known of the action of the Oregon commission, but it is believed that it will submit a well-considered draft to the legislature.

NORTH DAKOTA AND SOUTH DAKOTA.

The legislature of North Dakota has had presented to it the draft of an irrigation code formulated along lines which it is believed will put the state among those having the most advanced irrigation legislation. Similar efforts are being made by members of the legislature in South Dakota, and the prospects are also favorable in that state.

MONTANA AND OKLAHOMA.

In Montana the subject is receiving considerable attention and it is possible that legislation to improve its irrigation laws will result.

In Oklahoma as well, has this spirit of improvement in irrigation legislation been aroused, and this young and

vigorous commonwealth will doubtless do effective work in this line through its present legislature.

Even in states whose irrigation codes are considered as being up to the standard of modern development, amendments for further improvement are under consideration and will doubtless be passed.

NEW IRRIGATION LEGISLATION.

New legislation will be required, however, in nearly every one of the states in order to facilitate the operations of the Reclamation Service in several of its various lines of work, involving changes which are necessary to remove obstacles appearing in the local laws which were formed in the absence of such a movement as now exists under the Reclamation Act for large mutual corporations to manage and control extensive irrigation works and to distribute great supplies of water.

PRESIDENT ROOSEVELT'S MESSAGE OF 1901.

The striking point of interest in considering this subject is the earnest ef-

fort in each of the states and territories of the arid region to carry out the sentiment of the message of President Roosevelt which was sent in December, 1901, to the Congress which passed the Reclamation Act, which pointed out the need for these changes in irrigation laws, and which sounds the keynote of modern development in irrigation legislation:

"In the arid states the only right to water which should be recognized is that of use. In irrigation this right should attach to the land reclaimed and be inseparable therefrom. Granting perpetual water rights to others than users, without compensation to the public, is open to all the objections which apply to giving away perpetual franchises to the public utilities of cities. A few of the western states have already recognized this and have incorporated in their constitutions the doctrine of perpetual state ownership of water."

The strength, directness, and accuracy of this declaration by the President should not be lost sight of in the present activity along these lines.

POCONO PROTECTIVE FIRE ASSOCIATION

Description of an Interesting Pennsylvania Organization that Has Achieved Good Practical Results in Fighting the Forest Fire Evil

BY

THOMAS L. HODGE

THE Pocono Mountain, which occupies a considerable part of Monroe and a small portion of Wayne county, Pennsylvania, embraces roughly two hundred thousand acres of land. This was originally covered with hemlock forests, the last of which were cut down twenty-five or thirty years ago. Some of this land has been covered by

a second growth of timber; much of it, however, has been burned over every few years, so that most of the trees which are left are of very inferior quality, principally bull pine, scrub oak, fire cherry, and sumac. These fires have been so frequent that in places even the sod has been destroyed, the earth being baked and cracked, so that it has been

blown away by the wind, leaving nothing but blackened, broken stones. Under such conditions any natural re-foresting is, of course, impossible, there being no soil in which seeds could germinate.

The principal causes of fires in this locality are three in number:

(1) Those caused by sparks from locomotives, there being two railroad lines on the mountain.

(2) Negligent fires, caused by hunters and campers, who throw away lighted cigars and ashes from pipes, and leave camp fires unprotected.

(3) Incendiary fires. These have hitherto been the most serious, and were mostly started by berry-pickers who depend to a great extent for a livelihood on picking the huckleberries which grow in large quantities on this mountain. As is well known, these bushes do not bear well after they are three or four years old, and, to encourage the younger growth, the old bushes are burned off. These people never concern themselves about the damage done to other property, their only thought being the conservation of the berry crop. Consequently, such fires have often extended over thousands of acres of land, destroying much property.

With the view of preventing and effectually fighting fires, in the fall of 1902 the owners of upwards of one hundred thousand acres formed what is known as the Pocono Protective Fire Association, a regularly chartered organization. Under the provisions of the law, which provides for the appointment of deputy constables by the court upon the application of a certain number of citizens, they secured the appointment of deputy constables in each of the seven townships in which the association operates. These men have all the powers of fire wardens, with authority to call on any men in the community to assist in fighting fires. The fact that these men are appointed by the court, and are, therefore, not dependent upon the votes of their fellow-citizens for their election,

makes them independent in their actions, and they are of much more service to the association than the regularly elected constables. They are paid \$10 per month for the three months in the year in which there is the greatest danger from fire, viz: April and May in the spring, and October in the fall. Of course, they are expected to be watchful at all other times, and to extinguish any fires which may occur. In two or three cases large land owners have gratuitously given the services of their employees who have been appointed deputy constables. The association also makes itself responsible for the payment of the men who may be called out by their wardens to fight fires, instead of making them look to the county commissioners for compensation, which otherwise would be necessary. The promptness with which these claims are paid makes men much more willing to leave their work and respond to calls for aid.

Immediately upon organization, the association offered a reward, first of \$50, and then \$100, for information leading to the arrest and conviction of any persons starting fires, or for such information as could be used as evidence against the railroad companies. Publicity was given to these rewards by standing notices in the newspapers circulating through the district, and by muslin signs tacked on trees along the road and in conspicuous places in the woods. In addition, the association, through its attorney, notified owners of timber lands which were being cleared that they would be held responsible for any damage caused by fires which might occur in tree tops or other rubbish on their operations and spread to adjoining lands. Fortunately, there has been no occasion to make this threat good.

The expenses are met by an annual assessment of six mills per acre of land owned by the members. The officers receive no pay, the money being used for the payment of legal expenses in securing appointments, paying the

wardens and men assisting them, printing, etc. The charge per acre is so small as not to be a burden on any one, especially on the owners of small tracts, amounting as it does to but sixty cents per one hundred acres of land. Notwithstanding the insignificant pecuniary contribution, effort is made to secure the co-operation of the owners of small lots, the idea being that the greater the number of members the greater and more extended will be the interest in the work of the organization.

A novel method of fighting fires has been adopted in this region by the use of the ordinary hotel fire extinguisher. A number of these are put in a wagon, with barrels of water, and taken to a fire. One man running at top speed with an extinguisher can put out or check fifty feet of fire before exhausting it. When this is empty another is ready at hand for use, and the men following are able to beat out what fire remains. We do not know that this has been done elsewhere, but we have used these extinguishers with signal success.

The association has just completed the second year of its existence. During the first year there were but two fires not directly traceable to the railroads. All the fires which occurred during the second year were proven to have been caused by the railroads, but fortunately none of them was of a very

serious nature. As a result of our efforts to secure evidence against these companies, one of them has taken the precaution to burn all the grass, etc., on its right of way, and for some distance beyond, so that the danger from this source is minimized.

The practical result, therefore, of the two years' work has been the creation of a public sentiment against these promiscuous fires, as well as a wholesome respect for the association, backed as it is with its officers and members, with the necessary money at their disposal to prosecute all offenders. There have been but two incendiary fires in the two years, both of which were caused by persons seeking revenge. There have been no negligent fires which have not been put out by those who started them, and the railroad companies have been forced to clean their right of way to a greater extent than heretofore. Thousands of acres have thus been saved from devastation, which in time, if protected from fire, will gradually be reforested by natural means, if not by scientific methods. All this has been accomplished by an expenditure of less than \$900 for the two years.

While the work of the Pocono Protective Fire Association has been somewhat limited in area, the principle on which it works is one of general application.

GIVING MEN HOMES ON LAND*

A Discussion of the Sociological Phases of the
Campaign for Irrigation and Homebuilding

BY

GUY ELLIOT MITCHELL

Secretary The National Irrigation Association

THE minds of many thinking men are running in these days toward looking to the improvement of the social conditions of the laboring man through placing him upon a small

piece of ground, where he may make his home and from its products become to an extent independent of his daily wage. A large number of organizations have sprung into existence within

*Paper read before the American Association for the Advancement of Science, Philadelphia, Dec., 1904.

the past few years to accomplish this purpose, and although there has been no national movement as yet crystallized, the idea of Homes for Workers, Working Men's Gardens, Home Acres for Factory Employees, and the like has taken root in a great number of localities. In Europe, where the danger of congestion of factory hands is much more acute than in this country, the matter has received wider attention. An international congress in Paris last year discussed the subject of extending the work of allotting plots of agricultural ground to working men. Belgium had at that time provided 600 tracts in which plots had been allotted to 3,000 persons, and France 6,100 tracts which had provided assistance to 43,000 persons. A prominent American sociologist has during the past year, in a series of addresses, advocated the plan of providing home-acres for factory employees, and further propounded the radical plan that employers should arrange for a double shift of workers, each to work in the factory half a day and devote the other half to producing a living from his acre of ground. This, he contended, would give the laborer an opportunity to produce a living for himself and his family from the soil and save his rent, two items which, according to the statistics of the Government Labor Bureau, eat up more than fifty per cent. of the wages paid the American working man. At the same time, he maintained, the factory employer would secure greater labor returns, while the semi-independence created for his employees would largely reduce, if not entirely do away with, the strike problem. He advocated where possible the application of irrigation to these home-acres and presented facts and figures to show that one acre of good, irrigated land, tilled by an industrious man, will produce a far better living for himself and family than can be purchased by sixty per cent. of the average wage earning of the American factory hand.

IRRIGATION A HOME-CREATOR.

The educational features of the na-

tional irrigation movement have a direct bearing upon this subject. The primal effect of this law will be the creation of great numbers of small homes out of worthless land in the West, and as this work progresses year by year the feasibility of applying irrigation to the eastern or humid portion of the United States will come to be generally recognized. The social side of irrigation, wherever practised, can be described in the single clause:

Irrigation subdivides and re-subdivides lands into small home tracts.

The most highly developed irrigated communities average the smallest farms in the world. The West to-day contains thousands of five and ten-acre farms from which men are making comfortable livings. In Utah, where some very large ranches, thousands of acres in extent, are included, the census figures show the farm unit to be twenty-seven acres. Many notable examples could be cited where men have for years sustained themselves and families upon single acres. Two years ago I stood upon a commanding eminence overlooking the community of Riverside, in Southern California, the home of the famous Riverside navel orange, and viewed 22,000 acres. This panoramic display, where it seemed that almost every house was within a stone's throw of its neighbor, suggested to me some immense suburb of a city. The vast congregation of small homes was self-supporting; churches and school houses occurred frequently, good roads prevailed throughout the valley, and the residents enjoyed almost every privilege and advantage of an urban community, while at the same time they lived, worked and reared their children in the pure air and under the blue sky of heaven with none of the discomforts or unwholesome conditions to be found in the cities; and all this created by the artificial use of water out of land which twenty-five years ago was valued for stock-grazing purposes at \$1.00 an acre. A hundred similar examples could be cited in Southern California. The social con-

ditions of these intensely irrigated tracts are recognized by writers and travelers to be perhaps the most nearly perfect of those of any community in the world.

AN EMPIRE OF NEW HOMES.

Now, the effect of the great Government irrigation work, which contemplates the ultimate reclamation of some hundred million western acres—twenty times the area now irrigated—in small tracts, and which is being pushed rapidly forward, will be to create a western empire of new homes, and at the same time to incidentally educate the people of the entire country on the subject of irrigation.

The consequence of this will be that irrigation practices will gradually but finally enthral the eastern farmer. The facts as they exist in European countries show that irrigation can be practiced with great profit upon land which has sufficient natural rainfall to grow paying crops. Irrigation is, in fact, a crop-insurer, besides producing doubles yields, and when it shall be applied to eastern farm lands, where the conditions of water supply are much better than they are in the West, the same conditions will result which are found in the arid region—the farm will be divided into smaller and better tilled tracts. With the prosecution of the government irrigation policy and its great agricultural educational features, must surely come the establishment of rural colonies throughout the entire country, home-acres for factory employees, and the gradual trend of the present inclination toward city congestion, away from the tenement and back to the land as the primal source of all wealth.

CHANGE NECESSARY IN EDUCATIONAL SYSTEM.

Necessary to, and working along with this policy of intensive farming and high cultivation, is found a movement to engraft a practical agricultural education, nature study, and handicraft work upon our common school system, so that the working man of the coming generation will both want and

strive to own a home on a piece of land, and when he secures it will have some knowledge of how to make it productive and attractive. It is becoming a well-recognized fact that our present system of school education leads the boys and girls away from rather than back to the soil.

A DISCORDANT NOTE FROM THE WEST.

While the movement is thus gaining headway throughout the East to accomplish this result, and the eastern business men will doubtless vie with the philanthropist and the student of sociology to make the United States a country of small home owners, the speculative idea is still dominant in many sections of the West, where large tracts of land are still unreclaimed and unsettled. The national irrigation law is distinctively in its construction a conservative eastern measure, although it applies to western lands. Its provisions are rigid, requiring actual settlement of Government irrigated lands in small tracts by men who will live upon them and farm them, and various schemes are continually being evolved to evade its spirit and that of the old homestead law, requiring five years of residence as an evidence of good faith, fathered by Galusha A. Grow and signed by President Lincoln. Other laws have crept upon the statute book and are to-day in force which admit of the absorption of great tracts of land into single ownership, without improvement and without home-building.

PERILS IN LAND MONOPOLY.

At the recent National Irrigation Congress at El Paso, Senator Newlands, of Nevada, who originated the fundamental principle of the national irrigation law, sounded a note of warning to this country on the danger of land monopoly—a really live danger, he contended, to-day confronting the people of the United States, through the operation of their land laws. Under the timber and stone law, the commutation clause of the homestead law, the desert land law, and the forest scrip law, enormous tracts of western lands have been, and are to-day, being

absorbed into great individual tracts and held for speculative and stock-grazing purposes. I speak from personal knowledge and observation when I assert that in some of the western states tracts of land are owned and held in blocks of thousands of acres, many of which could be subdivided into 80 and 160-acre tracts, each supporting a family in as great comfort and plenty as the most productive tract of similar size in the fertile Mississippi Valley states. These lands have been taken, under the above-named land laws, out of the public domain of the United States, and to-day support only a few head of stock, or lie entirely idle.

The fact that many western men contend that the abrogation of these maleficent laws would retard the "development of the West" is of no significance other than to accentuate the fact that western land men are more interested in immediate personal benefit than in the creation of a great empire of small agricultural homes.

FAILURE TO ENFORCE THE LAND LAWS.

For years and years, after valiant but futile endeavor to administer these laws in such manner as to prevent fraud, Commissioners of the General Land Office, Secretaries of the Interior, and even Presidents of the United States have recommended to Congress their repeal, as constituting a menace to the present and future wellbeing of the nation; yet it is a sinister fact that sufficiently strong influences have been exerted upon Congress to prevent any radical action. It is true that some ten years ago there occurred what purported to be a grand overhauling of the land laws whereby several pages of revision and reform were placed upon the statute book; but it soon transpired that the powers of the land grabbers had been in no way curtailed. The official statement of the present Secretary of the Interior two years ago that, aside from the sociological features of the question, over one hundred million dollars in actual cash value had been lost to the people of the United States through the operation of the timber and stone law, is sufficient evidence of

the gigantic operations of the men who are opposing any change in our land system.

This is not an alarmist's statement; it is a fact, readily substantiated and which is well-known and admitted by every man who is personally familiar with the public land conditions in the West.

As against this policy of tremendous land operations the efforts of eastern organizations and associations looking to the creation of improved opportunities and facilities for the poor man who desires to get a piece of ground and a home are all but futile. While it may not be practicable at this time to provide for the movement of a great number of poor people out of the cities onto the lands of the West—although this is being demonstrated in a small way with considerable success by the Salvation Army—it is in reality the surplus man in any community who depresses that community. There are thousands of men in the East who have saved up some little money and who would to-day gladly escape from daily and precarious wage earning and go out upon the land and relieve the pressure, if they knew where to go and how to turn. It will be a comparatively easy task to show them the way to the fertile lands of the West, as they are developed, provided the lands are not previously absorbed by the speculator. Not the least important, therefore, of the many "paramount" questions before the American people to-day is the saving of our great western land resource for real settlement and the aversion of the dangers of land monopoly.

Nothing affects social conditions more than the subdivision of tracts of land, all the way from the great ranch of a hundred thousand acres into small free-hold farms, down to the division of the five-acre suburban tract into acre homes. The question is broadly national; it is one which, properly worked out, will solve many of our most perplexing problems, and one which opens to its students higher and broader vistas the more deeply and aggressively it is studied.

STRENGTH OF TIMBER TREATED WITH PRESERVATIVES

Effect of Preliminary Steaming, and of Different Preservative Chemicals and Processes Upon Both Green and Seasoned Timber

WITH the increasing use of timber, preserved in one way or another against decay and fire, it is important to determine the effect which the preserving process has upon the strength of the preserved timber. Many engineers believe that creosoted timber is more brittle and less capable of withstanding strains than the same timber before being treated with creosote. This is particularly true with bridge timbers and piling.

Actual tests are necessary to determine what relationship exists between the preservative process and the strength of the timber. Most of the tests hitherto made with preserved timber were made by comparing results on treated sticks with results on untreated sticks. In many instances these turned out in favor of the untreated timber. The reason why such tests are unfair to the preservative is that in the process of preservation two factors enter: (1) The actual process of impregnation with a preserving substance, and (2) the preliminary processes of steam seasoning, in the majority of treating plants in the United States. A piece of timber subsequently treated with creosote may be steamed to such an extent that the timber becomes exceedingly brittle. This, obviously, will be the fault of the steaming and not of the creosote.

Timber preservation divides itself broadly into three stages: First, the preliminary preparation; second, the actual preservative process, and, third, the treatment of timber following preservation. The final strength of the timber may be influenced materially by each of the stages.

The Bureau of Forestry has erected an extensive plant on the grounds of

the St. Louis Exposition for carrying on a series of investigations of the methods for preserving timber, and of the influence various preservative processes have upon the strength of the timber. These investigations have been organized and outlined by Doctor Herman von Schrenk and Doctor W. K. Hatt, of the Bureau of Forestry.

This general plan was pursued during the last few months at the timber treating and testing station at St. Louis in accordance with the following outline:

(1) To determine the effect of the preliminary processes, such as steaming, on the mechanical properties of the timber.

(2) To determine the effect of preservatives on the strength of timber, eliminating the effect of the preliminary processes.

In order to determine the effect of these factors, the program was divided into two parts—part 1, the effect of the preliminary process, and, part 2, the effect of preservatives.

The effects of the preliminary process were determined only on loblolly pine. Both green and seasoned timber was used in determining the effect of preservatives. The preservative fluids investigated included only creosote and zinc chlorid.

In making comparative strength tests of treated and untreated timbers, it is necessary to eliminate as far as possible the variations due to the great differences in quality of individual pieces of wood. This was accomplished in this case by using 11-foot timbers cut at the same time from one forest site. In testing the influence of preliminary processes of seasoning, a three-foot section was cut from one

end of each timber and sawed up into test pieces, which furnished a basis of comparison between (1) the results of tests on these "control" pieces, and (2) the results on test pieces taken from the remaining eight-foot section after the latter had been subjected to the various preliminary processes in the treating cylinder.

In testing the effect of preservatives themselves the entire 11-foot timber was subjected to the preliminary seasoning processes, after which a three-foot section was cut from the end of each timber. The three-foot section thus having been subjected to the preliminary seasoning processes formed a basis of comparison with the remaining eight-foot section, which was treated with the preservatives. In this way the separate effects of the preliminary processes and the effects of the preservatives could be isolated and determined.

Because of an apprehension that defects of brittleness of treated timbers might not be evidenced by the ordinary tests under slowly applied loads, provision was made for both static tests and impact tests. The test pieces were subjected to crossbending strain, compression along the grain under both static and impact conditions, and under shearing parallel to the grain and compression at right angles to the grain under static conditions. The data taken include the moisture conditions, specific gravity, and rate of growth. During the treating operations, records were kept of the temperature to which the timbers were subjected at all stages, the amount of water lost or gained, and of the amount of preservatives absorbed, as indicated by gross weight and subsequent chemical analyses of the test pieces.

Ordinarily the strength tests were made immediately after treatment in the cylinder. In order, however, to determine what weakness might be introduced by changes in the physical condition of the preservatives in the wood through lapse of time, a com-

plete series has been set aside for subsequent operations. An additional set of test pieces has been loaded with different percentages of the strength, as exhibited under the ordinary tests, and this load allowed to act for long periods of time, the deflections being measured from day to day.

While this program is not sufficiently advanced to allow the drawing of final conclusions, yet the preliminary results are fairly indicative of what may be expected. It is found that the steaming process weakens the resistance of the wood fiber to both static and impact loadings. It may be stated that this diminution of strength is very nearly in direct proportion to the length of time that any given steam pressure is applied. The diminution of strength was found to be 25 per cent. after a pressure of twenty pounds was applied for ten hours to green loblolly pine, and 10 per cent. when a pressure of twenty pounds was applied for four hours. This diminution of strength increased very rapidly when the pressure rose above twenty pounds and amounted to about 25 per cent. when a pressure of fifty pounds was applied for four hours.

It will be easily seen that when the conditions of time and pressure are made very severe, the conditions prevailing in a pulp mill industry will be approximated. Evidently it is well to avoid when possible the use of these preliminary steaming operations in the wood-preserving industry.

With relation to the effect of preservatives themselves, the latter is distinct from the preliminary process. It may be said that the treatment with zinc chlorid does not seem to further reduce the strength of timber beyond the effect of the steaming process. This might have been expected when it is considered that the strength of the zinc chlorid solution ordinarily used does not exceed $2\frac{1}{2}$ per cent. The strength of timber that had been treated with the $2\frac{1}{2}$ per cent. solution of zinc chlorid after having been steamed four hours at twenty pounds pressure was the same as that of timber which

had been steamed without the subsequent application of zinc chlorid. The same statement may be made of timber treated with an 8½ per cent. solution of zinc chlorid. It may be that subsequently the crystallization of the zinc chlorid will weaken the wood fiber. This remains to be determined.

The effect of the creosote appears to be the same as that of an equal amount of water in weakening the fiber. That is to say, the strength of creosoted timber is that of green timber. The difference is that while green timber gains strength upon seasoning, the creosote oil remains in the wood, and, it appears from analysis of a pile thirty-five years old, that the oil remains

in a liquid condition. Consequently, comparison between seasoned timber and creosoted timber will always result to the disadvantage of the latter as far as its strength is concerned. In the case of creosoted wood, it also remains to determine what changes in the wood fiber take place through lapse of time in the presence of creosote oil.

It is expected that a bulletin will be issued upon the results of these investigations when the tests are completed. This bulletin will also contain the results of the investigations to determine the best methods of preserving wood so that the maximum impregnation may be obtained with the least expenditure of oil per cubic foot of timber.

TREATING TELEGRAPH POLES

Two Great Corporations Very Desirous of Discovering a Means to Effect a Large Economy

FOR the last two years the Bureau of Forestry has been co-operating with the American Telephone and Telegraph Company and recently with the Postal Telegraph-Cable Company also, in an experimental study to increase the durability of telegraph and telephone poles. The interest in this matter taken by these corporations promises an important forest economy through the possibility of using much smaller trees than are now cut for poles. This means a new market for these smaller trees and liberating the larger ones for other uses.

The length of service of a telegraph or telephone pole is determined in a section of the pole not more than a foot or a foot and a half long. In a standing pole this section extends about six or eight inches above and below the top of the ground. This is the universal point of attack upon the life of the pole, and is called its breaking point. Decay is the arch-enemy of these poles. It sets in at the ground line and reaches both up and down the

pole, but only so far as the conditions exist which promote the growth of wood-destroying fungi. A few inches below the ground there is lack of the necessary oxygen and heat, while at about the same distance above ground the requisite moisture fails. The exact time at which decay begins its work depends upon the climate, the character of the soil, and similar conditions. In a hot, moist climate it ordinarily sets in with great rapidity. But at best, in a very few years after the pole is set the struggle has commenced. The decay soon girdles the pole and gradually eats into it deeper and deeper until it is so weakened that it breaks under the weight of its equipment.

The strain upon the pole from wind pressure and the weight of its cross-arms and wires is calculated for the ground line. When the diameter of this ground line is constantly decreased, the strength of the pole is proportionately reduced, and it becomes only a question of time when the pole

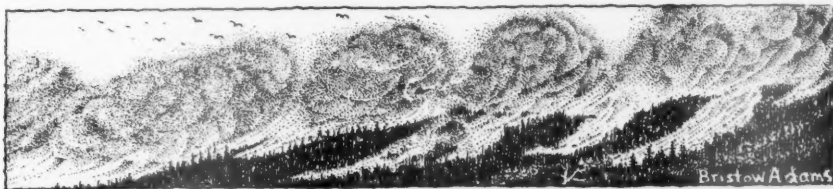
must fall. Chestnut and white cedar have been found, among available woods, most successfully to resist decay; but the life of the former is only from twelve to fifteen years, and of the latter ten to twelve years. The co-operative study of the Bureau is for the purpose of extending, if possible, this time.

The experiments already made by the Bureau show conclusively that poles can be subjected to a preservative treatment which insures materially lengthened service. This treatment consists in impregnating the wood with antiseptics which prevent the growth of the fungi that cause decay. The treatment of telegraph and telephone poles, when attempted at all in this country, generally has been applied to the whole pole, requiring the use of air-tight cylinders 100 feet long or more. In these the poles are subjected to live steam for some time, when a vacuum is created. Creosote is then run in and pressure applied to force it into the wood. Manifestly this is a laborious process. Yet for telegraph and telephone poles only about one foot of the entire length needs to be made immune from fungus. If this foot at the fatal ground line can be preserved from decay, the rest of the pole will take care of itself. Experiments will now be made in treating the butts of the poles for a distance of about eight feet, thus carrying the antiseptics just beyond the zone of decay attack. The creosote method will be used and dead oil of coal tar forced through the butt of the pole.

The telegraph companies have made little use of preservative treatment. They employ millions of poles on their various lines, and it would be a tre-

mendous economy to add even a few years of service to the life of each pole. But there will be another large saving both to them and to the forests through preservative treatment. To provide a good margin against decay, poles are now much larger than demanded by the strain upon them. It is expected that decay will quickly eat away a furrow around the pole at the ground line, and the diameter of the pole at that point is gauged to allow for this weakening process. When it is known that decay, in a certain number of years, cuts the diameter from perhaps twelve to eight inches, and that below eight inches the weakened pole falls, the course to be pursued is obvious. Antiseptics prevent, for the time of their effectiveness, the starting of decay, and thus permit at the outset the selection of an eight-inch diameter rather than a twelve-inch. The four inches saved represent a tremendous difference in the size and age of trees used for poles. Both the companies and the owners of forests will be great gainers by this economy, with its shortening of the length of time necessary to grow a pole.

Another feature of the co-operative work will be treatment of cross-arms. The companies have been treating them, but report too much absorption in some cases and not enough in others. The Bureau will more carefully grade the different kinds of wood, and treat each class separately. In this way it is expected to secure a more equal absorption and more satisfactory results. These are the main points covered by the contracts, though in addition the Bureau will furnish information on the supply of pole timber and such general advice as may be suggested by the co-operative work.



A PORTO RICO FOREST RESERVE

Characteristic Tropical Forest and the Uses to Which it Can be Put

THAT one of our national forest reserves is in Porto Rico is a fact of which very few people in the United States are aware. Yet both in the extraordinary variety of botanical species which its forests contain and in the picturesqueness and novelty of its scenery this reserve stands second to none of those in our western states, while it has the unique distinction of being the only tropical forest which this country owns on this side of the globe.

The Luquillo reserve was set aside by Presidential proclamation in January, 1903. It embraces some 65,950 acres of land in the eastern and most mountainous part of the island. Compared with most of the western reserves this is small. But the whole island of Porto Rico is only about three-quarters the size of Connecticut and consequently offers no room for a large reserve.

Teh Luquillo reserve was set aside from certain public lands in Porto Rico which were formerly the property of the Spanish government. It is joined by private holdings and also to some extent by lands the title to which is now vested in the insular government, which is possessed of all lands not reserved by the federal government before June 30, 1903. The whole region within which the reserve lies has never been surveyed or accurately mapped, and the boundaries between the private and public holdings are very vague and undefined. In practice the agriculturists to whom the private lands belong have pushed their clearings as far up the mountain sides as it was profitable for them to go, and have helped themselves more or less to whatever timber they needed from the accessible forest beyond. These depredations have not been, on the whole,

very serious, owing to the tropical character of the forest and the difficulties of transportation, but the exact definition of the line between the reserve and the adjoining private owners is a pressing need.

To secure information concerning present conditions and a basis for recommendations to the insular government for a future policy, Dr. John C. Gifford was sent by the Bureau of Forestry, in the summer of 1903, to make an examination of the reserve. He found that only about 20,000 acres are forest lands unclaimed by private owners, and half of this is in mountain peaks and palm lands, so that there are only 10,000 acres of productive timber. Nevertheless, the whole reserve stands in an important relation to the economic welfare of the people who live near it, and the benefits of its establishment will be increasingly manifest as time goes on.

Even to the natives the region embraced in the reserve is little known. It is a small wilderness of serrated mountains, tropical forest, and rushing torrential streams, concerning which all sorts of fantastic fables find currency. It covers a large part of the Sierra de Luquillo, a mountain mass separated from the mountains of the rest of the island by the valley of the Loiza, the largest river in Porto Rico. One of its peaks, El Yunque, is the highest mountain of the island, with an altitude of some 3,300 feet. Upon the eastern slopes of these mountains, which face the sea, the westward-blowing trade winds pour an enormous precipitation, the heaviest in the island. In 1902 the total was almost 142 inches. This rainfall is well distributed throughout the year. In the highest mountains it is rare for twelve hours to pass without some rain. As

a rule heavy, drenching shows alternate with bright sunshine. The result is violent fluctuations in the streams, which often leap into impassable floods and subside again within an hour or two.

It is as an agency for the control of these flood waters that the Luquillo reserve is likely to render the most valuable service. To some extent the forest will even supply water for agriculture, for immediately to the south and west of the mountains the climatic conditions become very different from those on the always profusely watered eastern slopes. The country is drier, evaporation more active, and the vegetation correspondingly changes its character. So while parts of the island are drenched with water most of the time, other parts, half a day's ride distant, are dependent upon irrigation. But generally it is against too much water rather than the want of it that the protection of the forest is needed. Even with the mountains forest-covered, floods have caused great destruction. Massive stone bridges have been carried away, roads damaged, farms and pastures ruined, and lives lost. Stripped of their forests, the mountains would soon be washed bare of soil and the lowlands swept by floods after every heavy shower.

What the value of the reserve will be as a source of timber supply is more or less problematical. Mahogany, if ever present in the forest, as seems probable, has been entirely exterminated, and the cigar-box cedar is also practically gone. Valuable woods remain, but the essentially tropical character of the forest, in which a great number of species contend with one another for possession, makes the problem of management a very difficult one. "Weed trees" abound, and there is no uniformity of forest growth. Individuals of the same species occur scattered sparsely and irregularly through the dense forest, and it is an extraordinary fact that within so narrow a range as the island affords certain kinds which in some places

grow to be large and beautiful timber trees elsewhere exist as shrubs.

The best of the forest in the reserve is that found in the fertile gorges, ravines, and covers from 500 to 2,000 feet above sea level, where the trees are protected from the constant winds. There are four leading timber trees—the tabanuco, with a wood very like our sycamore; the laurel sabino, which would grade in the market with yellow poplar; the ausubo, comparable with the black walnut, and the guaraguao, similar to red cedar. All these trees reach a large size, ranging from two to five feet in diameter. The tabanuco has, in addition, the very valuable characteristic that it tends to form pure or nearly pure stands. It produces a kind of gum which may prove to be an article of commercial importance.

Many climbing vines add to the density of the vegetation. There is also a species of grass which grows five feet high and cuts like a razor at the lightest touch. But the most abundant growth is that of the mountain palms. They are very beautiful, but of little or no value, and to get rid of them will be at once a necessary and most difficult matter if permanent production of salable timber is to be secured. They grow forty feet high, and already cover fully half of the best part of the reserve. Yielding as they do an immense amount of seed, and growing very thickly, nothing else in the forest can compete with them for possession on anything like equal terms, so that unless they can be artificially held in check they will certainly gain most of the ground left vacant by the removal of trees cut for timber. They are true weed trees of the most aggressive kind.

Above two thousand feet altitude the trees are stunted, gnarled, and slow-growing, of many different species, with moss-covered limbs and roots often bare. They are of no commercial value, but are of great importance as a protective forest cover.

Doctor Gifford believes that the Luquillo reserve should be cared for and

developed along two distinct lines. From an economic point of view it should be managed to secure the best returns from the sale of timber and other forest products, consistent with the maximum protection of the watersheds. It should also be made acces-

sible to the public for its scenic attractions. Roads should be opened and fish and game introduced. At the same time from a scientific standpoint the extraordinary interest of its undescribed flora opens a splendid opportunity for studies of tropical forest botany

FORESTRY AND THE RAILROADS

Wooden Tie-Plates are Successfully Being Used Under Advice from the Bureau of Forestry

UPON the advice of the Bureau of Forestry, the Gulf, Colorado and Santa Fé Railroad eight months ago began to experiment with wooden tie-plates. These plates are intended to protect the tie from wear under the rail. They are cut the width of the bottom of the rail and as long as the tie is wide—usually six or seven inches—and are kept in place by the weight of rail, in a flat groove in the tie. The results of the experiment are of much interest both to the railroads of the country and to those who have at heart the cause of forest protection.

The Santa Fé placed cypress tie-plates one-quarter of an inch thick on several thousand old and much-worn cypress ties laid in its track north of Galveston, Tex. After eight months of constant use the plates are perfectly sound and show practically not a trace of wear. The officials of the road are greatly pleased with the result of this trial.

The Bureau of Forestry will now make similar experiments with red gum, red oak, and beech tie-plates, which will be placed in the tracks of the St. Louis and San Francisco, the Burlington, and the Northern Pacific systems. These are all harder woods than cypress, and are therefore less liable to wear under the rails, but are much more subject to decay. The tie-plates made from these woods will therefore all be heavily creosoted. This will make them about as resist-

ant to decay as the untreated cypress, while their much greater hardness will better qualify them to resist the wear of the rails.

For a number of years cross-ties have been treated with preservatives, and tie-plates of iron have been used to increase their length of service. Tests are constantly being made by the Bureau of Forestry to improve the character of the preservatives and the methods of their application, and to enlarge the number of woods used for railroad construction purposes. Experimenting with wooden tie-plates is work along the same economical line, in the interest of both the railroads and the forests. The use of a tie-plate prevents wear on the tie and adds years to its service; wooden tie-plates are being successfully substituted for the more expensive iron, and abundant and cheaper woods, through preservative treatment, are becoming available to take the place of scarce and expensive woods. When a wooden tie-plate is worn out a new one can be quickly and cheaply inserted in its place. In Europe these plates cost but \$2 a thousand, or \$2 for every 500 ties, since two are used upon each tie. Preservative treatment keeps the tie from decaying, the wooden tie-plate keeps it from wearing, and the use of both will result in a huge economy for the railroads, which will react favorably upon our forests.

COLORADO PRACTICING FORESTRY

The State to Create a Separate Department to Control its Forest and Help Build Up its Industries

TWO political platforms in Colorado contain a declaration favoring the creation of a state department of forestry. This, if carried into effect by the legislature, will notably benefit both the state and forestry, since the general welfare of Colorado is peculiarly dependent upon the rigid care and protection of its forests. Almost one-third of the total area of that state, or 33,500 square miles, is woodland, of which about 20,000 square miles are covered with valuable timber. This is chiefly pine, although cedar, hemlock, spruce, fir, and other species are also found in merchantable size and quantity. But the greatest value of the Colorado forests is in their promotion of agriculture through irrigation. Already there are nearly 2,000,000 acres of farm lands under irrigation, but great stretches of country are still to be redeemed. This cannot be done unless the watersheds of the state in the mountains and hills are rigorously kept under forest cover.

The grazing and lumber industries, as now conducted, and the ravages of fires are against the forests. The lumbering and still more the grazing interests of the state are too valuable not to receive careful consideration. Each, and more particularly the latter, must be carefully and judiciously regulated with two ends in view—their own welfare and continuation, and the protection of the forests. As for fire, it is the same deadly enemy in Colorado as in other large forested areas, and restraining regulations must be enacted and enforced.

Forest preservation is a vast economic question intimately interwoven with many other matters of vital state concern, but it is a question with a distinct field of research and demands specialized inquiry, enactment, and jurisdiction. Hence the necessity for the

creation of a state department of forestry. Through it all local work can most effectively be done, and it also furnishes an agency through which the state may come into closer touch with the National Bureau of Forestry and thus secure advice based on a wide range of investigation.

The federal government has put something over 3,000,000 acres of the public land on the watersheds under forest reserve. In addition, agents of the Bureau of Forestry have, within the past two years, made careful studies of both these reserves and other public forests of the state, to the end that the federal forest reserves may accomplish the greatest possible good. But 3,000,000 acres are a small part of the 21,440,000 acres of woodland in Colorado. All the remaining 18,000,000 or more acres are to a greater or less extent important in conserving the irrigation and farming future of the state. It is, therefore, fortunate that Colorado seems likely to handle its forests in this practical way, the only way by which the best results can be accomplished.

Such action will increase to twelve the number of states which have created separate departments of forestry. Yearly and daily the importance of understanding and guarding the forest, which stands in close relations to many and varied industries, is growing. Each state which adds the weight of its official action gives new impetus to the movement which aims to secure the largest usefulness of our forests in the interest of the public welfare. Other states, particularly those whose forests are among their greatest resources, could do nothing more practically beneficial to their future than quickly to follow the policy now demanded by the people of Colorado.

USE OF THE GRAIN DRILL IN IRRIGATION DISTRICTS

BY

HERBERT M. THOMAS

IF THERE is one agricultural implement of the humid east which is eminently adapted to the irrigation farmer, it is the grain drill, and it is perhaps the least used of all the ordinary implements of the farm, for over the greater part of the irrigated west, grain is either broadcasted by machinery or by hand, and harrowed into the soil.

Irrigated soil has the faculty of baking on the surface, in many districts, and it is a peculiar fact that such soils are the ones in which the grain is broadcasted and where the first irrigation so bakes the surface that the tender little plants have a struggle for life. This can largely be avoided by different methods of procedure. In Utah, where the small farmer is the rule and where the average farm in certain counties is about 25 acres, the grain drill is in use, and there is never heard the statement that the drill is "too slow." In California, where the grain farms are large, seed is either broadcasted or sowed just behind the plow by a contrivance which resembles in its operation the grain drill.

The method of grain land management, which seems most successful in soils which bake, is something like the following: The land is irrigated and plowed; if it seems too dry for the seeding of grain, a second irrigation is then given it, and when the amount of moisture is just right, grain is sowed with the drill. The seeds are deposited in a moist soil and the drill leaves the surface in a cultivated condition so that the top crust cannot form to choke down the seedlings. Germination results promptly, and the little plants find themselves in the

proper depth of soil with the roots in moist, compacted material in capillary contact with the subsoil, while a mellow surface does not hamper the development of stem or leaves, and before the soil's store of moisture is depleted the plants are so far developed that the next irrigation does no harm, and the shade produced prevents the baking of the surface of the ground.

On the other hand, the customary method is something like the following: The land is plowed (sometimes), harrowed (sometimes), and grain is sowed by a broadcaster; a harrow or drag then goes over the surface, leaving part of the seed for the birds, another part in shallow soil, and none of it in the most favorable condition for the sturdy growth so necessary in a young plant. The majority of the germinating seeds find it necessary to send the rootlets down an inch or two through half-dried soil to find moisture, while the leaves pushing upward have a like amount of dry material to penetrate before air and sunshine can be reached. Plants struggling along under such conditions have a weakness bred in them from the start, and in the growth which follows are not so well enabled to resist the difficulties which may beset them.

Farming under irrigation is fast losing the extensive character so characteristic of American agriculture, and taking on the intensive character which means getting all out of the soil there is in it. The grain drill is one important instrument in this progress. Irrigation is developing many new tools, but there is none so well adapted to the needs of the irrigation farmer as the grain drill.

THE SAFE-GUARD OF THE RECLAMATION FUND

BY

F. H. NEWELL

Chief Engineer U. S. Reclamation Service.

MANY of the people in the East have only vague ideas as to the practical workings of the Reclamation Law. With not a few the belief seems to be that the Government is engaged upon a purely philanthropic work of constructing large and costly irrigation systems, and after completion generously donates these works to the farmers. While Uncle Sam is certainly evincing an exceedingly fatherly interest in his children who dwell in the desert, his generosity does not extend quite to this point.

The manner in which the return of any funds expended on irrigation is safeguarded will strike most everyone as being similar to the methods observed by business institutions which make a practice of loaning money.

When the investigation of an irrigation project is developed to such an extent that there is little doubt of its feasibility, it becomes necessary to provide for an association of water users. This is essential because it would be otherwise impossible to work out satisfactorily the various matters in which the interests of the Government and of the individuals are involved.

One of the important matters to be adjusted by these water users' associations is the protection of the Government in its expenditures. The law provides that the water users shall return to the reclamation fund the cost of the construction of the works. There can be no assurance of the return of such moneys unless security of some kind is provided. This interest of the government is protected through the water users' association by a provision in its articles which makes all assessments on water rights,

including the charges by the Government, a lien on the land of the shareholder.

Furthermore, the water users' association as such makes a contract with the Secretary of the Interior in which it guarantees the payment of the charges assessed against the lands of its shareholders. This agreement, before being executed on the part of the corporation, is voted upon by the shareholders, and a two-thirds vote is necessary to ratify it.

The shareholder and the water users' association, through their articles of incorporation, make a contract by which the land of the shareholder is pledged for the payment of necessary charges; and in addition to this the association guarantees to the Government that it will pay these charges and exercise the lien authorized by its articles in order to secure such payment. The matter is in this way left in the hands of the people themselves, and in case a shareholder should, through sickness or other unavoidable misfortune, be unable for a year or two to pay his assessments, the association can advance the money to carry him over his period of misfortune. In cases where the delinquent is not deserving of such consideration, his own neighbors, knowing the exact situation, will be in a position to enforce the conditions of the articles of the association and sell such part of his land as may be necessary to cover the charges for the water right.

These charges are a lien on the land only to the extent of a particular assessment from year to year, and in case of a delinquency the entire charge for the water right does not become

due and chargeable against the land as in the case of an ordinary mortgage when default is made on a part payment. This is not necessary under the conditions of a reclamation project, because the land itself is of such great value that there is no difficulty in obtaining settlers to take up the land which an individual is compelled to relinquish.

The whole theory of the water users' association is to provide for self-government among those who use the water and pay for the irrigation system. The law provides that they shall ultimately manage and maintain the

system at their own expense, and the policy of the Reclamation Service is to put into their hands an increasingly greater share of the management, in order to gradually educate them up to the point of controlling in the proper manner an enterprise of such great magnitude. The law provides that the ownership of the system and a supervisory control shall always be maintained by the United States, in this manner affording ample assurance to each individual that the rights which he has acquired from the United States shall always be fully protected.

IOWA PARK AND FORESTRY ASSOCIATION

The Fourth Annual Meeting Successful
and Shows Much Interest in the State

THE fourth annual meeting of the Iowa Park and Forestry Association was the most successful that this organization has yet held. The following officers were elected for 1905: President, L. H. Pammel, of Ames; vice-president, Wesley Greene, of Davenport; secretary, Prof. Thomas H. Macbride, of Iowa City; treasurer, J. C. Monnett, of Iowa City; executive committee, J. S. Trigg, of Des Moines; H. P. Baker, of Ames, and C. A. Mosier, of Des Moines; legislative committee, C. L. Watrous, of Des Moines; B. Shimek, of Iowa City; Sidney Foster, of Des Moines; Bruce Fink, of Grinnell, and Elmer Reeves, of Waverly; committee on ways and means, Wesley Greene, W. A. Burnap, of Clear Lake; Eugene Secor, of Forest City; committee on civic improvements, A. T. Erwin, of Ames; Silas Wilson, of Atlantic, and B. Shimek.

Dr. Bruce Fink, of Grinnell, delivered an interesting address on the proper methods for tree pruning, pointing out common errors commit-

ted and suggesting the best methods to follow. "Forestry in Northwestern Iowa" was ably discussed by Ellison Orr, of Waukon.

Prof. T. H. Macbride made a plea for the preservation of the old historic landmarks like Camp McClellan and other historic spots in Iowa that are dear to the memory of the pioneers.

The secretary of the association, Prof. L. H. Pammel, reported on what the college has done in planting, both for park and forestry purposes, during the last thirty years, giving a list of the hardy trees like the white pine, white spruce, red elm, Austrian pine, elm, Norway spruce, hemlock, hard maple, soft maple, red cedar, and cottonwood, giving accounts of their hardiness and adaptability to different conditions.

Professor Shimek, of Iowa City, on "Reforestation in Iowa" said: "Each one of more than half the counties of Iowa contains rough lands, conservatively estimated at 10 to 50 square miles in total area, which lie chiefly

along the larger streams. These counties are mostly in the southern and eastern parts of the state, but include those also cut by the Des Moines and its larger tributaries, and some of those which lie along the Missouri." The lands in question are not suitable for cultivation. He advised township and county parks, to take better care of private property, and that our public schools should disseminate information which is desirable along the line of forestry.

In his report on "Civic Improvement and Municipal Legislation," Prof. A. T. Erwin reported that the destruction of trees by telephone companies had multiplied. Rural telephones and suburban car lines had increased, and the question of the protection of trees is more important than ever before. In many cases the roadway is entirely too narrow. A tree with a good clean trunk is highly desirable; such a tree is the white elm; it adapts itself more to these unfavor-

able conditions than many others. The Iowa law, if enforced, is regarded as ample to protect the trees. Mr. J. C. Monnett presented a long and valuable paper on the legal phases of tree protection by property owners in various parts of the United States.

Papers were also read by Dr. J. E. Cathell, who eloquently pleaded for the beautifying of our cities and for forest reserves to develop the goodness and greatness of man. Dr. A. B. Storms likewise pleaded for a greater civic pride and enthusiasm in our cities, citing as an illustration the notable work accomplished by the late Colonel Waring, of New York, and the enthusiastic civic movement in many cities. Professor Ashbaugh made a strong plea for the preservation of certain lakes for forestry and park purposes in the state. Doctor Mogridge discussed the subject of school gardens as a tendency to a better knowledge of agricultural and horticultural problems of to-day.

THE BELLE FOURCHE PROJECT

THE principal work of the Reclamation Service in South Dakota this year will be on the Belle Fourche project. In this State attention has been given only to reclamation projects west of Missouri River, and especially to those in the vicinity of the Black Hills. Any reclamation of lands on any of the streams of this region must be founded on storage of storm water and spring flow.

The Belle Fourche River rises in east-central Wyoming and flows northeast, then east, draining the western and northern portions of the Black Hills. This project involves the reclamation of lands lying north-east of the Black Hills, in Butte and Meade counties, South Dakota, by the diversion of the waters of the Belle Fourche and Red Water rivers into a large basin east of the town of Belle Fourche, South Dakota. This basin

is to be converted into a storage reservoir by the construction of an embankment of earth, riprapped with rock, across Owl Creek.

The reservoir will be filled by a large feeder canal from the river, 6 1-2 miles long, 40 feet wide on the bottom, and capable of carrying 10 feet depth of water. Additional water will be obtained from Crow, Owl, Indian, Horse and Willow creeks, which have a large flood flow during limited periods. From the reservoir, which will have sufficient capacity to impound water for all the lands to be irrigated, the water will be distributed to lands in the valley on both sides of the Belle Fourche River, where 80,000 acres of land may be reclaimed. The land was segregated July 18, 1903. The segregation comprises 465,600 acres.

A reconnaissance of the project was made from June 22 to 25, 1903, by Mr.

R. F. Walter, district engineer, and gaging stations were established on Belle Fourche and Red Water rivers, by which the daily run-off is determined. Surveys were ordered in July, 1903, by Mr. C. H. Fitch, supervising engineer, and a preliminary survey was made of the canal line to Owl Creek reservoir. The north outlet canal from the reservoir was run to Willow Creek, and a high-line canal to Dry Creek No. 2. In all 115 miles of canal line were located before work had to be abandoned for the winter.

The two sites known as Dry Creek and Wilson reservoirs were mapped on a scale of 1,000 feet to the inch, with 5-foot contour intervals. A reservoir area of 5,700 acres was thus covered. The Survey also took up topographic mapping on a scale of 1:45000, with 20-foot contour intervals. An area of about 75 square miles was thus mapped.

In April, 1904, a reconnaissance survey was made to determine the possibility of obtaining an increased water supply from the Little Missouri River and of storing the water thus obtained. It was found that such a plan was entirely practicable.

At present work on the project is well advanced. Preliminary surveys on inlet canal (to feed the storage basins), on north outlet canal, and on the proposed Dry Creek and Wilson reservoir sites were completed in 1903.

During the past summer the south side canal, which will water lands on the south side of the Belle River in the vicinity of Vale and Empire, was surveyed and mapped on a scale of 200 feet to the inch.

The survey of the extension of the north side canal from the point where work was stopped in November, 1903, was resumed and the line was extended to the Elm Creeks. A large body of vacant land is located here which may be brought under the project if the private land owners under the south side canal fail to subscribe for water and the canal is not built.

The Owl Creek reservoir site has been surveyed and has been mapped

on a scale of 1,000 feet to the inch, with 5-foot contour intervals. This is an extension of the Dry Creek reservoir site, obtained by the change of the location of the dam to a point across Owl Creek just below the mouth of Dry Creek. The capacity is more than double that of the first site contemplated, but the cost is much less than double.

The mapping of the Alzada reservoir site on the scale of 1,000 feet to the inch with 5-foot contour intervals, has also been completed and estimates have been made. The feeder canal for the reservoir from the Little Missouri River has been surveyed, either to be used as a diversion of this stream to the Belle Fourche or as an independent project.

The irigable lands have been mapped on a scale of 1,000 feet to the inch, with 5-foot contour intervals. About 200 square miles have thus been mapped on both sides of the river above the Willow Creek divide.

Detail sheets have been completed of the main diversion dam site, Owl Creek dam site, south side canal diversion dam site, and the Indian and Crow Creek crossings. These sheets are on a scale of 200 feet to the inch, with 2-foot contour intervals.

Borings have been made at all dam sites and creek crossings for the purpose of obtaining information as to foundations. They have also been made at points from 500 to 1,000 feet apart along the canals for the purpose of classifying the material to be moved.

The organization of the private land owners has secured subscriptions for about three-fourths of the private land under the whole project, or four-fifths of the private land on the north side.

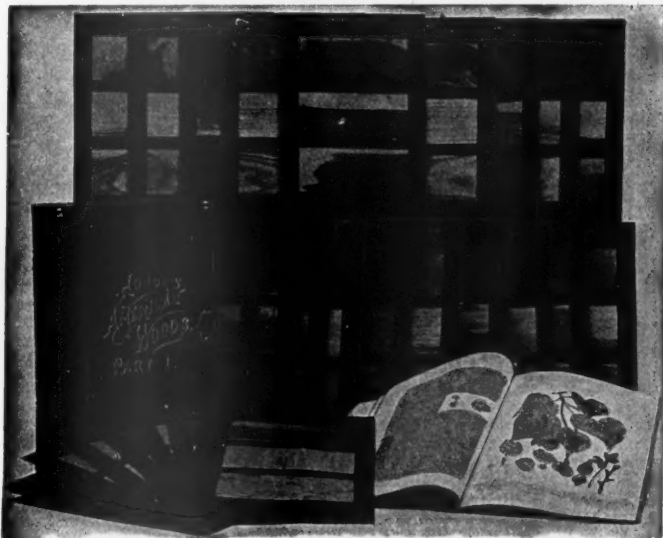
The available water supply has been estimated, and plans for all permanent structures have been drawn.

A reconnaissance was made in June, 1904, of the headwaters of the Belle Fourche River for suitable sites for further storage, but no feasible sites were found.

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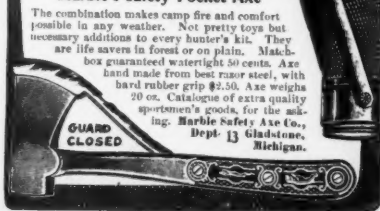
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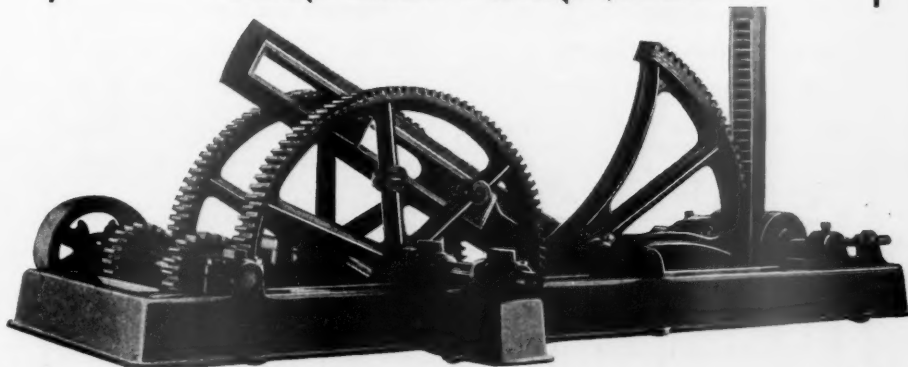
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